The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

VOL. I. AUGUST 16, 1919 No. 9.

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21/- per annum for the United Kingdom, and 26/- Abroad. Cheques, P.O.O.'s, and Postal Orders should be payable to Benn Brothers, Ltd.

Editorial & General Offices—8, Bouverie Street, London, E.C.4.
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines

The German Potash Question

IT is difficult to discover precisely what the position of the Government is in regard to the importation of German potash into this country, and there is a certain amount of curiosity as to the negotiations which are reputed to be going on between the authorities and people commercially interested. According to Reuter's Berlin correspondent, in a message dated August 5, the Anglo-German potash agreement has been ratified by the respective Governments, and the equivalent of 22,500 tons of pure potash is expected to arrive in England within a few months. Almost concurrently it is announced by the United States War Trade Board that German potash, having been removed from the limited list of materials subject to war-time restrictions, may therefore be imported into the United States.

The position in America as regards the importation of potash, whether German or French, appears a little complicated, and the United States Ways and Means Committee will have to consider it on account of the demand for protective measures. On the one hand American manufacturers of fertilizers are credited with the claim that they are able to compete with foreign supplies of potash; on the other hand, the secretary of the United States Potash Producers' Association (Mr. F. W. Brown) says the statement that American producers can compete with foreign supplies originated with the American head of the German Potash Syndicate's branch in the United States. Mr. Brown also understands that Messrs. H. J. Baker and Brother, New York, who have been appointed sole selling agents in the United States for Alsatian potash, will probably be named as selling agents for German potash, negotiations being under way to have German potash pass through French hands. Small fertiliser manufacturers, who do not buy potash direct from large producers, favour one selling agency, because they believe the selling costs will be lower than if each foreign potash company were represented by a different firm, and prices will consequently be lower.

The statement that the Alsatian potash agents in New York may be appointed selling agents for German potash is one of great interest, because precisely the same point may arise in this country. Although no definite announcement has been made, it is thought that the Government have practically purchased the 22,500 tons of German potash, as payment in return for food supplies, and also with a view to meeting the demand for fertilizers, and the question of its distribution and price will have to be settled carefully. Inquiries, we believe, have been made of the Board of Trade, and an impression exists—whether it is well or ill-founded we cannot at the moment say—that the authorities are disposed to "push" the sale of this German potash at the expense of the French article. If this is so, the policy will certainly require explanation. We can quite understand the acceptance in exchange for food stuffs of any material that Germany has to dispose of, but two conditions must be firmly insisted on—firstly, that no sort of preference should be given to German stuff over that available for sale to us by Allied nations (if any preference is permissible at all, it should be the other way about); secondly, that there must be no manipulation of prices or of supplies at the expense of the British consumer. These points are naturally in the minds of people interested, and the Board of Trade, the Board of Agriculture, and any other Department concerned will naturally be expected to steer an even course between any rival interests, with particular regard to avoiding any appearance of preference for products of recent enemy nations. We understand that Alsatian potash is now coming into this country, but not quite as freely as it might, in consequence of restrictions. However, Jersey and Guernsey have already received about 12,000 tons of the French product, and 3,000 tons of muriate of potash has just been shipped from Rotterdam to Australia. The fertilizer question is one of great interest to British agriculture, and the regulation of imports is being watched with considerable keenness.

New United States Import Duties

We learn by cable from one of our correspondents that a Bill is now before the United States Congress to provide for a very severe schedule of import customs duties on acetic acid, acetate of lime, wood alcohol, and kindred products. The Bill, which is known as House of Representatives' Bill No. 7115, and is introduced by Representative Jones, of Pennsylvania, proposes the following duties:—

Acetate of lime, charcoal and formaldehyde, 25 per cent. ad valorem;
82 per cent. (crude) alcohol, 25 cents. a gallon;
95 per cent. and up (refined) alcohol, 50 cents. a gallon;
Acetone, 5 cents. per pound;
Acetic acid, 10 cents. a pound.

"Such a schedule," our correspondent states, "would of course entirely close the American market for these materials to outside producers. There is a very considerable production of calcium acetate, acetic acid and acetone in the United States, but it is produced almost entirely by the destructive method of distillation from wood. During the war the price of these products ran to an extraordinary figure. Early in 1917, however, the Canadian Electro Products Company, a subsidiary of the Shawinigan Water and Power Company, came into the market with acetic acid manufactured by the synthetic process at their works at Shawinigan Falls, Canada. The economy of this method of production brought prices to a more reasonable level, and it was recognised as such an important development that the American Government undertook the installation of a plant at Shawinigan Falls to provide for their own war needs. During 1917 and 1918 immense quantities were shipped to the Imperial Government for various war purposes.

"Since November last acetic acid and its derivatives manufactured by this process have become very important factors in the commercial markets of the United States and Great Britain, and evidently the American producers by the old method are endeavouring to keep it out of their own market at least. As will be noted, the tariff provides for duties ranging from 25 to 80 per cent. ad valorem. It is understood that very strong opposition is being offered to the Bill in Congress."

This is a matter of considerable importance to a country which has made such efforts as the United States has done to develop its wood distillation industry, and to produce synthetic acetic acid and acetone. This country, however, will not be affected to any great extent, because both before and during the war we imported from America and Canada a large proportion of our requirements.

Potash as a Fertiliser

For more than four years (a correspondent writes) British farmers have been compelled to forego the use of potash, which, together with nitrate and phosphoric acid, is now considered indispensable if healthy and plentiful crops are desired. Potash quickens the flow of the sap, contributes to the formation of starch and sugar, ripens the wood, deepens the colour, and gives both vegetables and fruit a sweetness as probably no other artificial fertiliser can; at the same time it strengthens the constitution of the plants, and renders them less liable to disease. From experiments carried out by the agricultural schools of Alsace it was found that the lack of nitrate and phosphoric acid merely caused a decrease in the outputs, but the lack of potash resulted in weaker stalks and unhealthy looking foliage. These signs were especially noticeable on potatoes, sugar beet, tomatoes and wheat. These experiments, and many others in this country, have proved that the elements contributing to an increased output are:—

Manuring	45 per cent.
Selection of plants	30 ,,
Working of soil	25 ,,

The prejudice which at one time prevailed against the use of artificial fertilisers has disappeared, and to-day it is even admitted that the soil can scarcely have too much potash, though the proper proportion of the other ingredients, such as nitrogen and phosphoric acid, must never be lost sight of. It is an interesting fact that the country which was the most lavish in the application of potash salts before the war was Holland, with the result that her production of wheat was, in proportion to the soil under cultivation, the highest in Europe. Some German districts which also showed a splendid yield had at one time been regarded as having poorer soil than any other country. The poverty of the provinces of Brandenburg and Pomerania had been proverbial; nowadays they may be described as the granaries of Central Europe. Light and peaty soils can absorb very large quantities of potash, and the result is extremely profitable. It has been demonstrated that moorlands which had never yielded any crops could be turned into prolific soils if potash were applied without stint. These light soils suffer quickly from drought, and the use of potash remedies this defect, and thus improves the character of the soil. While the use of potash on light soils has become general, its application to heavy soils met with prolonged opposition, and its advantages were only begun to be appreciated with recent years. Heavy soils thus treated have yielded richer crops, and have also resisted weeds much more effectively, as well as attacks by parasites. Heavy soils generally contain potash already, but only in an insoluble or hardly soluble form, so that it is of little practical value to the crop. For this reason the application of easily soluble potash is essential, and an abundant supply of this fertiliser pays as well on heavy soils as it does on light ones.

Trade Returns

The trade returns for the past month indicate a striking advance in values, both in imports and exports. Although the month had one working day less than July of last year, imports advanced in values by 44 millions sterling, British exports by 21¾ millions, and re-exports by 9¾ millions. Compared with June, which had three working days less than the past month, imports were higher in value by 30 millions, and home exports by three-quarters of a million, but re-exports were reduced by a quarter of a million. The adverse balance of trade, as shown in the returns, was, for the month, 76 million pounds, against 63½ millions in July, 1918; and for the seven months 402½ millions, as compared with 452 millions in 1918. The following figures show the value of imports and exports for the month, and for

the seven months ended July, with the percentage of increases on the corresponding periods last year:—

JULY, 1919.

Imports	...	£153,140,032 + 40.3	per cent.
Exports	...	65,315,422 + 49.6	,,
Re-exports	...	11,757,383 + 481.3	,,

SEVEN MONTHS ENDED JULY, 1919.

Imports	...	£869,956,763 + 14.2	per cent.
Exports	...	400,070,679 + 37.7	,,
Re-exports	...	67,192,553 + 257.3	,,

While imports in each case show an increase, and an immense total excess over exports and re-exports, it is gratifying to notice that the rate of increase is much higher in the case of exports and re-exports than in that of imports. One great need of the country is the restoration of our export trade, and for that we need a large production and freedom from labour trouble. We need, in fact, to combine the whole resources of capital and labour in order to restore the trade of the country as speedily as possible.

International Research Council

As the result of deliberations in Brussels, extending over ten days, the constitution of an International Research Council has been finally agreed upon, and is intended to come into force on January 1, 1920. Chemical science and industry in Great Britain and several Allied countries were well represented in the discussions, and though the questions to be dealt with present special difficulties owing to the industrial applications, a perfect agreement, we understand, was ultimately arrived at. At the final meeting it was unanimously resolved to invite nations that had remained neutral during the war to take part in the work of the Council. For the moment Germany and her associates are excluded, and no good purpose could be served at present by discussing any probabilities of their admission. The purpose of the Research Council, it is almost unnecessary to say, is to co-ordinate international efforts in the different branches of science and its applications, to initiate the formation of international associations or unions, and to enter through the proper channels of communication into relation with the Government on matters falling within the competence of the Council. Science, like scholarship, knows no racial or linguistic barriers. It was meant for the service of mankind, and co-operation should be as much a part of its material organisation as it is of its spirit. We are glad to see chemical science and industry so well represented in the movement, and look forward to good results from the increased intercourse which is one of its main objects.

The Institute "Proceedings"

THE *Proceedings* (July, 1919) of the Institute of Chemistry records some more than usually interesting developments during the past quarter. The acknowledgment by the Ministry of Munitions of the valuable services rendered by the Institute during the war has already been made known, and now we have an interesting suggestion for the publication of a volume to serve as a literary memorial of the services of British chemists during the war. The General Purposes Committee have had under consideration a schedule of possible contents of such a book, and preliminary arrangements have been made with Messrs. Constable & Co. to act as publishers. All chemists who are in a position to assist are invited to communicate with the Registrar. A committee has also been appointed to consider jointly with a committee of the Institute of Metals the position of chemists and metallurgists in the Services and in the Reserve and the action to be taken towards securing for them due recognition and adequate status. Further, a design has been prepared for a memorial to Fellows, Associates, and students of the Institute who have died in the service of their country, and the work will be put in hand as soon as the roll of honour is known to be complete.

Considerable correspondence has taken place respecting the relation of professional chemists to the Whitley Council proposals. At an interview with Mr. G. J. Wardle, M.P., means were considered by which the Institute might be of service to the Ministry and the Industrial Councils in connection with technical questions arising under the Whitley Report, and at the same time act in an advisory capacity on matters affecting the interests of chemists. While nothing definite resulted, the views of the deputation were sympathetically received. Another subject under consideration has been the metric and decimal system. The committee, to whom the matter was referred, recommended that chemists should be urged to exert their influence to promote the extension of the metric system, but did not feel called upon, as chemists, to make any pronouncement on the adoption of a decimal system of coinage. Steps have also been taken to secure the due recognition of chemists by the Ministry of Health and the Scottish Board of Health. It is interesting to hear that the Council are still receiving a steady flow of applications for the Associateship and Fellowship of the Institute under the regulations of last year.

The Acetyl Cellulose Report

THE Report of Lord Sumner's Committee of Inquiry regarding the British Cellulose and Chemical Manufacturing Co., Ltd., which has been rather keenly awaited, was issued late on Thursday. It would be unfair to express any definite judgment on the conclusions of the Committee, until we have had time to study the text of the Report. But our first impression is that the findings of the Committee are on the whole favourable to the company. They conclude, as a net result of their inquiry, that there has been "neither favouritism nor corruption," and that the official action of the Departments concerned has been the best possible to them "under the circumstances." They have been unable to procure any evidence that the capitalisation of the company was used to procure undue influence for the company or that the company enjoyed any undue influence. These brief quotations may be sufficient for the moment to indicate the general spirit of the Committee's conclusions. Next week we hope to publish a summary of the Report, and to comment on it more fully.

Bonus Systems for Chemical Works

By Norman Swindin, A.M.I.Mech.E.

Payment by results is the first step towards the harmonisation of the interests of capital and labour. Bonus systems at present lie under a cloud of suspicion from both sides, though the Rowan system is meeting with success. The following article is the result of much research carried out in a large chemical works in the application of the Rowan system to the chemical industry.

THE just reward for services rendered will ever remain a difficult problem. As justice itself is a growth and depends in the end on the general intelligence of the age so do methods of payment of individual effort depend upon the general view of the worth of various kinds of labour. Students of industrial history are aware of the various phases of wage systems that have operated in the past. Beyond a mere mention of some of these systems it is not the purpose of this article to discuss in detail the stages through which wage payments have evolved, but rather to show how some modern conceptions of premium and other bonus systems can be applied to modern chemical industry.

Whether "payment by results" is ultimately the true criterion by which the profits from an industry should be apportioned it is, at any rate, a nearer approach to the principle "If any will not work neither shall he eat" than the present day scramble for high profits, high salaries, and high wages. The system that can place the ordinary acquisitive commission agent higher than the trained industrial chemist is manifestly wrong. There are signs to-day of the growing appreciation of this anomaly, and the demand for payment by results is one of them. It is to be regretted that organised labour in this country, at least, is opposed to any general application of this principle, but when it is recognised that the opposition is based on a suspicion that the results and benefits arising from the use of a bonus system go unreservedly to the capital side of industry and not to the State as representing the people it is evidently the duty of capital to allay the suspicion and deal openly with the vexed question of the true apportionment of profits. If all who control the policy of our great industries, whether masters or men, will but remember that "in the long run the course of things industrial is determined by permanent economic conditions and factors and the broad facts of competitive industrial life are always educating the workers in the mass," the strike and the lock-out will disappear as a factor in wage disputes.

In the middle ages, when industry was largely a thing of craftmanship, the wages of workmen were to a large extent controlled by tradition resting upon conditions created artificially by the Trade Guilds. It is true the law of supply and demand in the end operated, but the guilds, by their policy of exclusiveness, contrived to stereotype their ideas of wages into the laws of Parliament. Their limiting of the number of men allowed to work for these wages showed an appreciation of the futility of a law of Parliament to operate against adverse economic conditions.

With the gradual introduction of machinery, and especially in the use of steam to drive factories, the craftsman lost his independence and control, and he was superseded by the millowner. The workman thus became an operative or a "hand," and wages were depressed to the lowest possible level. The guild spirit rose again in our modern trade unions, who sought to limit the free play of economic factors as a factor in fixing wages.

We have now arrived at a point in industrial development when wage payments are not to be a mere item in the works expense account, but that the workman must be paid his proportion of the profits of the concern. Spasmodic attempts at "profit sharing" have been made during the past fifty years with only moderate success. The weak point in most of these "co-partnership and profit-sharing" schemes appears to be that the profit of a concern is not primarily due to labour, notwithstanding all the high-flown talk of "labour produces all." Though the whole of the working staff work as galley slaves an error of policy, the choice of a wrong process (in a chemical concern a point of supreme importance when processes come and go as "a thief in the night"), and bad organisation and control will fritter away any profit or even wreck the concern. Bonus systems when properly applied and properly understood, have the advantage that the individual workman or a number working as a team receives his reward for his own efforts apart altogether whether a subsequent operation destroys these efforts. In any concern bonus systems can be devised for every grade of service from the unskilled labourer to the manager. It has long been the practice to pay managers commissions on the year's working, and it is suggested that these commissions be paid to every grade of servant downwards, depending on the responsibility and work.

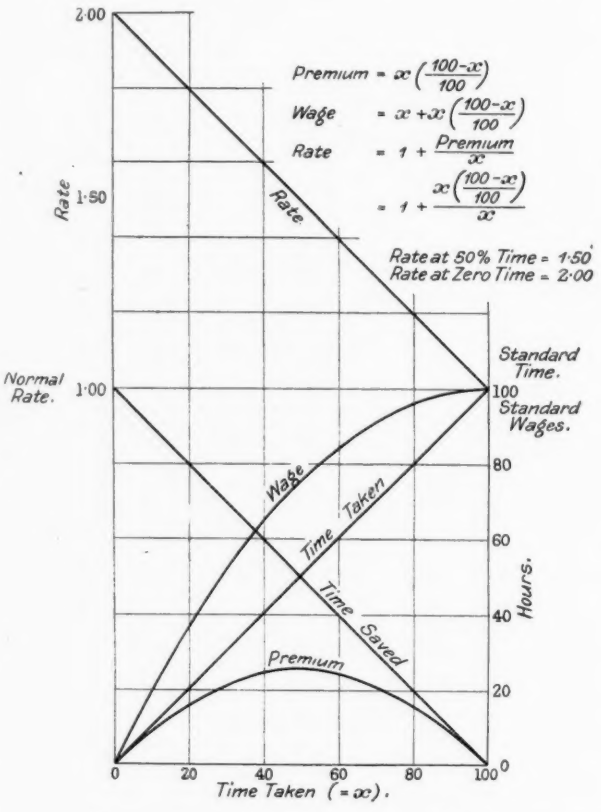


FIG 1.—GRAPHS OF ROWAN BONUS SYSTEM.

Now any bonus system is an attempt to apply reasoning of both parties to fix the reward of industry instead of resorting to conflict where one of the parties is compelled to assent against its desire. A bonus system, no matter

how crude, is an attempt to harmonise the interests of capital and labour.

In most trades ordinary piecework has long been practised, but it is still looked upon by the more highly-skilled worker as a wage-depressing device. The success of a piecework system depends upon a carefully adjusted price for the work. If the price is too high, the worker receives an extravagant payment, and is tempted to hang back in his efforts in order not to raise the suspicion that someone has blundered to his benefit. If, on the other hand, the price is too low the worker cannot make that extra amount above day wages which is the inducement for the extra effort called for. Attempts have been made to devise bonus systems which automatically correct for blunders made in the cost department. The Rowan system is one of these, but it is only applicable in its usual form where payment is made on a time basis. Its general statement is :—

Payment at full normal rate for that proportion of the time saved which the time taken bears to the time allowed.

$$\frac{\text{Time taken} \times \text{Time saved}}{\text{Time allowed}} = \text{Bonus}$$

Thus if 100 hours be the time allowed
and 80 ,, ,, ,, taken
then 20 ,, is the time saved.

$$\text{Rowan's Bonus is } \frac{20 \times 80}{100} = 16 \text{ hours.}$$

Payment then for 80 hours' work would be 96 hours at normal rate.

Suppose the office had made a mistake and had allotted 100 hours for a 20 hour job, then

$$\text{Rowan's Bonus} = \frac{20 \times 80}{100} = 16 \text{ hours,}$$

and payment for 20 hours' work would be 36 hours at normal rate.

This and similar systems work well in highly organised engineering trades, but in the chemical industry the conditions are totally different and bonus systems must be devised on output in ascertained units. Fig. 1 shows graphically the points of the Rowan system.

Boiler Firing

The efficient stoking of steam boilers is not merely of interest to the chemical industry, but with best coal at £2 6s. per ton it is work of national importance. Many attempts have been made to pay boiler stokers on a bonus system. Most of these fail because they do not take into account all the factors under the stoker's control. The factors contributing to good results are :—

1. Duty.
2. Economy.
3. Steadiness of pressure.
4. Care of the plant.

Item 1 is ascertained by measuring the feed water, item 2 by measuring the feed water and the fuel, and item 3 can be recorded on a suitable recording pressure gauge. Item 4 depends ultimately upon the opinion of the engineer in charge. The cost of renewals, of course, is known from the costing system, but this item does not necessarily depend on the fireman's care. The accompanying chart Fig. 2 is drawn from data taken over long periods from the working of a battery of 50 boilers fired

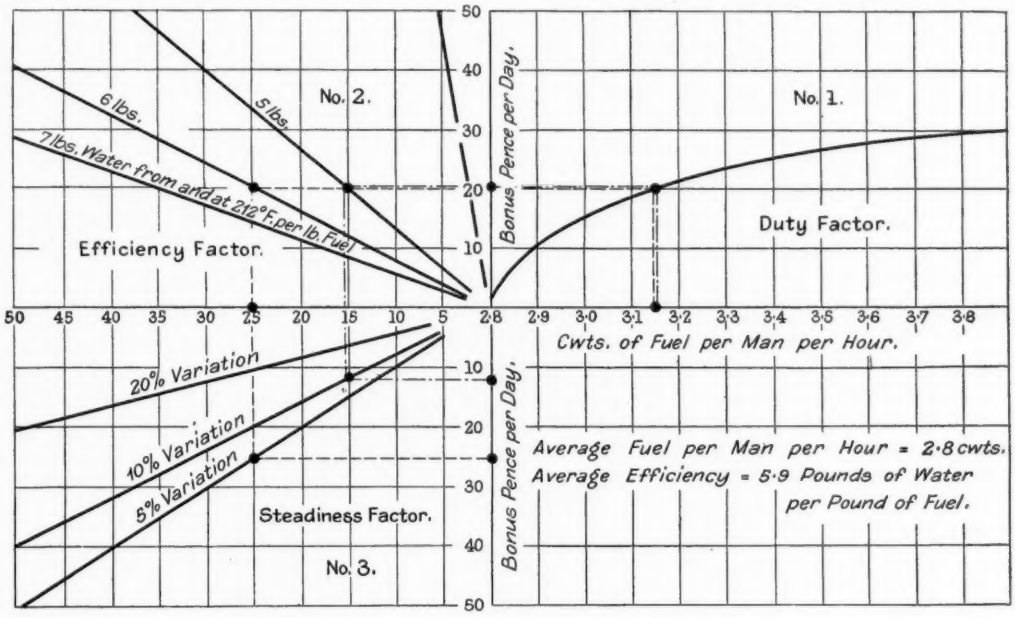

No. 2.
No. 1.
6 lbs.
5 lbs.
7 lbs. Water from and at 212° F. per lb. Fuel
Efficiency Factor.
Duty Factor.
Bonus Pence per Day.
50 45 40 35 30 25 20 15 10 5
2·8 2·9 3·0 3·1 3·2 3·3 3·4 3·5 3·6 3·7 3·8
Cwts. of Fuel per Man per Hour.
20% Variation
10% Variation
5% Variation
Steadiness Factor.
No. 3.
Average Fuel per Man per Hour = 2·8 cwts.
Average Efficiency = 5·9 Pounds of Water per Pound of Fuel.

FIG 2.—"N.S." BONUS SYSTEM FOR BOILERS.

with very poor coke breeze. The output per man appears to be low, but the figure represents the quantity of fuel consumed per man, including the whole boiler staff and carters. However, the diagram is given to show the principles of applying a bonus system designed to take into account duty, economy, and steadiness of pressure.

The diagram is based upon the use of polar ordinates combined with the Rowan limiting curve. This curve is a parabola, the limiting ordinate being set to prevent the fireman from drawing a ridiculously high bonus which would cause dissatisfaction in the rest of the staff. The curve is placed in quadrant No. 1, and gives at a glance the bonus due for the simple act of coal shovelling. Quadrant No. 2 contains the polar lines so placed as to add the factor for economy, and quadrant No. 3 are placed similar lines contributing the factor of steadiness of pressure—a most important item where stills are being worked. For example :

The records for a particular period give—

3·15 cwts. of fuel fired per hour per man ;
6 lbs. of water evaporated per lb. coal ;

5 per cent. variation of pressure as shown on a pressure recorder.

Following the dotted line, we find each man would get 20 pence per day bonus for firing, which is increased to 25 pence by the efficiency factor, and maintained at this point by the steadiness factor. Had the efficiency been 5 lbs. and the variation 10 per cent. the bonus would have been that indicated by the chain line thus :—

20d. – 15d. – 12.5d.

The automatic reduction of the original 20d. per day bonus to 12.5d. makes a direct appeal to the fireman that his efficiency does not equal his energy.

Operations of Kindred Character

A much more difficult task is to arrange a bonus system for a gang of men engaged on plant capable of turning out a variety of products according to the demands of the market. An instance of this is the ordinary tar distillation operation, in which tar may be distilled right through to pitch, or be merely dehydrated. About a tar plant there are many smaller jobs such as special refining, mixing, cleaning, etc., included in the day's work. The difficulty here is to bring these various operations and tasks to a common denominator. In other words, to find out what is an average day's work upon which to fix the bonus. In order to present this type of bonus in general terms, let

A represent the main operation;
B ,, ,, secondary operation;
C ,, ,, subsidiary tasks about the plant.

In any given day there are thus

A units of substance treated in the main operation,
B ,, ,, ,, ,, ,, secondary operation,
C ,, ,, ,, ,, in various subsidiary ways.

If operation C be ignored it is found that if the whole labour costs on the plant are expressed in terms of operation A a close relation exists between the ratio B/A and cost of operation A. This relation is expressed graphically in Fig. 3. It is now a simple mathematical operation to find the equation to this curve, and hence the differential coefficient—

Where x = per cent. operation B/A,
and y = cost of operation A,
then $x^2 = 4a(y - b) + b$,
where a, a constant = 30,
b ,, = 8.

The labour cost y is that sum paid for actual labour and thus excludes war bonuses of all kinds, holiday money, clerical labour on the plant, and supervision. Now, if operations A and B were the only ones to be taken into account it would be a simple matter to express B in terms of A, for it is known that operation B takes about twice the time that of operation A, but the varying operations included under C bring into play another variable which accounts for the curve Fig. 3. Instead of a constant factor of about 2 to bring operation B in terms of A, we must find a variable factor depending on the proportion of B/A. The differential coefficient of the curve Fig. 3 gives us this. If now we multiply operation B by this floating factor and add this quantity to operation A, we get a new quantity, which may be termed bonus quantity, representing in one number the actual labour power involved.

The differential coefficient of the curve Fig. 3 for $x^2 = 4a(y-b)+b$ is

$$\frac{dx}{dy} = \frac{60}{x}$$

so that for 5% $^{B}/_{A}$ the factor is $\frac{60}{5} = 12$

and for 40% $^{B}/_{A}$,, $\frac{60}{40} = 1.5$

For example: Let 1615 units be treated in operation A and 246 units in operation B. Then

$$\%\ ^{B}/_{A} = \frac{246}{1615} \times 100 = 13.3\%$$

The factor for this is $\frac{60}{13.3} = 4.51$

Hence the bonus quantity is

$= 1615 + (246 \times 4.51)$
$= 2725$

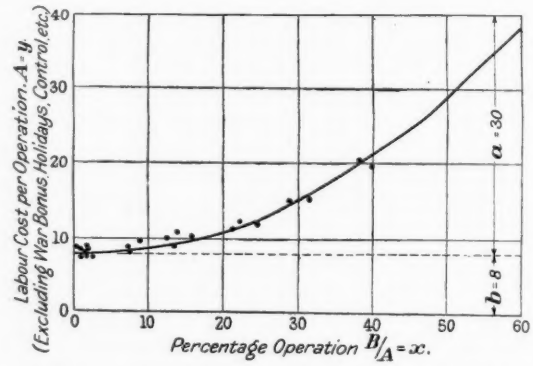


FIG. 3.—FUNDAMENTAL BASIS OF BONUS SYSTEM FOR A SET OF KINDRED OPERATIONS.

The accuracy of this method can be verified by plotting on the same chart the bonus quantity calculated as just described and the actual labour cost. The two curves should follow each other in the same way. Fig. 4 shows a diagram which has been drawn from results extending over two years, 1916—1917, the latter year being an extremely abnormal one.

Explanation of Curve Chart. Fig. 4 :—

Abscissae in all cases are Calendar months, *i.e.* length, corresponds to number of days.

Curve A, operation A.
,, D ,, B plotted above A,
,, J, actual labour cost obtained from wages total,
less War Bonuses,
Clerical Work,
Control,
Holiday money for men.
,, G, number of men per month calculated as follows :

$$\frac{\text{Actual cost per month (}\textit{See J}\text{).}}{\text{Average net day wage per man.}}$$

,, H, bonus quantity, calculated as follows :—
First find floating factor $B/A \times 100 \times \frac{60}{x}$.
Multiply quantity operation $B \times$ factor.
Add this to quantity operation A as explained.
This curve follows generally line of labour cost J. Under ideal conditions the two curves H and J should coincide if plotted in appropriate units.

Curve E, bonus quantity per man per month,

i.e. $\frac{H}{G}$

Curve F, cost per unit bonus quantity,

$\frac{J \times 240}{H}$ in pence.

Bonus.—

Curve B. This fixed in such a way that the cost per unit bonus quantity falls as the bonus rises. No bonus system

can operate unless it justifies itself in reducing the cost of production. The ordinates of this curve are monthly wages per man. At £8 per month no bonus is drawn; at £12 per month the man gets £4, or £1 per week extra.

Curve *C*. Cost per unit bonus quantity.

The apportioning of the bonus should be left to the Works Committee, on which the men are represented. If no such committee exists, then an arrangement mutually agreed on must be made.

By the proper application of the Rowan limiting curve and by careful analysis of the works figures and records it is possible to plan bonus schemes to suit every operation in the chemical works. The two examples cited are given to show the possibility of applying bonus schemes to complex operations.

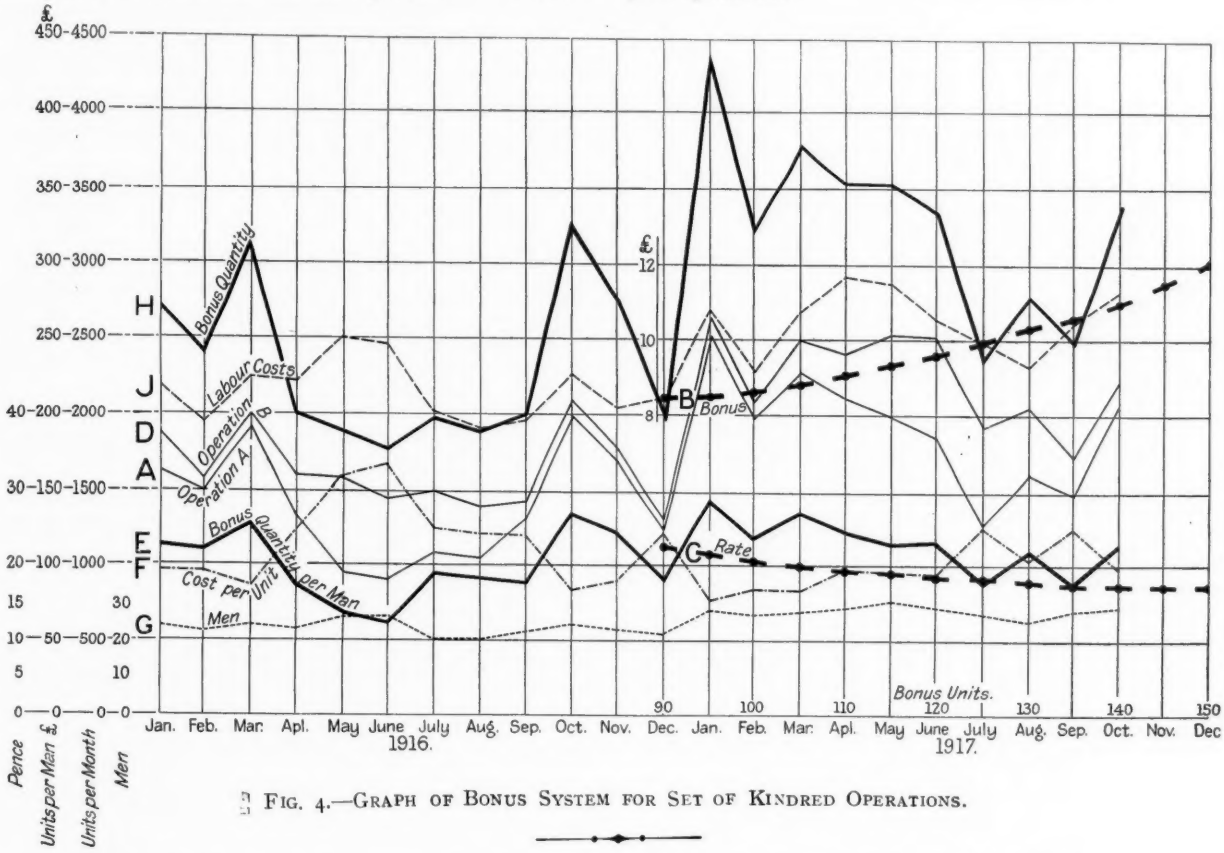


FIG. 4.—GRAPH OF BONUS SYSTEM FOR SET OF KINDRED OPERATIONS.

Sir Oliver Lodge on Sources of Power

To the *Observer* of Sunday Sir Oliver Lodge contributed the first of three articles on the general subject of "Sources of Power."

Food, he writes, is the oldest source of power, and thereby is obtained the strength of man and animals. It all represents solar energy, stored in the first instance by vegetation—it is all, in Stephenson's phrase, bottled sunshine—but it is a store which can be tapped at will, and can be directed along any channels which may seem wise and serviceable. Combustibles are precisely in the same predicament. Food is to the animal engine what wood and coal are to the artificial engine, put together of iron and other materials. The supply of such power is limited, and the economical utilisation of the store of energy latent in fuel is of the utmost importance. On that subject chemists are entitled to give the lead, and statesmen and practical men would be wise to learn and follow.

Chemical action is one great source of power. It may be latent in the properties of a single substance; that is, in the constitution of its molecule. Some molecules are unstable, especially those containing certain groupings of nitrogen, the atoms hang together by bonds which are liable to fly asunder with extraordinary vehemence. They are under severe constraint, like a coiled-up spring. Supply the necessary shock and they fly apart with explosive violence.

Another and more tractable source of chemical power is the re-combination of molecules, the transference of atoms from one grouping into another grouping. Gunpowder comes into this category; its different ingredients are intermixed so that a spark enables them to re-combine into a different arrangement, liberating a store of energy in the process.

The utilisation of chemical power appears to be still in its infancy, judging by the barbarous way in which we deal with deposits of the past. Digging them up and setting fire to them is what even a savage might be able to do; we ought to have learnt better than that.

Chemists have drummed into our ears that all manner of valuable products are contained in the deposits of a bygone age. How dare we burn them indiscriminately! They tell us how to deal with them, they show us surprising compounds which can be extracted from the unlikely looking material, they know how to treat the whole so as to remove the valuable and leave only the combustible matter. The residue, properly dealt with, we can burn intelligently and smokelessly. We can utilise the solid and gaseous residues, as instructed, we can generate energy on the spot wherever the raw material is plentiful, and we can transfer power electrically or gaseously from place to place with great economy and convenience. The achievement of all this now is a matter of statesmanship rather than a question for science.

But even so, the supply of past energy is not inexhaustible. Are there any sources of power not yet tapped? Is there any indication of stores of energy independent of what we get from the sun? Ought mankind to be beginning to think of problems which in the course of the next century or so may become pressing? Already the question is being asked, and before long it may become of practical and even vital importance. Indications of such an answer as may now be tentatively surmised will be the subject of the next or next two articles.

Chemical Imports and Exports

The following figures show the value of the imports and exports of chemicals, drugs, dyes, and colours for the month, and for the seven months ended July 31, together with the increases or decreases as compared with the corresponding periods of 1917 and 1918:—

MONTH ENDED JULY 31.

	1917.	1918.	1919.
Imports	£2,185,510	£3,895,778	£2,157,313
A decrease of £1,738,465 as compared with 1918, and of £28,197 as compared with 1917.			
Exports	£2,118,790	£1,823,239	£1,984,955
An increase of £161,716 over 1918, and a decrease of £133,835 as compared with 1917.			
Exports (Foreign and Colonial) ...	£281,800	£285,617	£330,175
An increase of £44,558 over 1918, and £48,375 over 1917.			

SEVEN MONTHS ENDED JULY 31.

	1917.	1918.	1919.
Imports	£13,847,995	£22,258,224	£12,828,133
A decrease of £9,430,091 as compared with 1918, and of £1,019,860 in 1917.			
Exports	£13,478,819	£12,872,704	£16,312,972
An increase of £3,440,268 as compared with 1918, and £2,834,153 as compared with 1917.			
Exports (Foreign and Colonial) ...	£1,964,611	£1,722,997	£3,252,145
An increase of £1,529,148 over 1918, and £1,287,534 over 1917.			

I.—IMPORTS AND CONSUMPTION.

	QUANTITIES.						VALUE.					
	MONTH ended 31st JULY.			SEVEN MONTHS ended 31st JULY.			MONTH ended 31st JULY.			SEVEN MONTHS ended 31st JULY.		
	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.
CHEMICALS, DRUGS, DYES, AND COLOURS:												
CHEMICALS:												
Acetic Acid (other than for table use) .. .. .. *Cwts.*	3,868	3,151	8,480	67,945	53,349	45,149	£ 38,282	£ 15,725	£ 25,711	£ 408,097	£ 370,479	£ 194,887
Bleaching Materials .. .. ,,	—	28	—	1,465	68	2,450	—	26	—	1,867	195	10,865
Boracite, Borate of Lime, Borate of Magnesium, and Borax .. ,,	40,869	—	30,300	123,912	107,839	145,950	43,485	—	36,680	140,323	163,031	177,361
Brimstone .. .. .. ,,	3,290	171,200	1,013	34,830	670,023	104,224	2,785	110,220	1,228	23,588	306,372	90,313
Carbide of Calcium .. .. ,,	34,310	37,146	47,161	282,378	326,995	387,137	34,301	64,154	61,145	284,060	549,235	519,995
Coal Products, not Dyes .. .. ,,	4,597	1,797	1,274	28,868	12,902	21,664	49,420	15,726	21,710	341,083	136,296	93,776
Cream of Tartar .. .. ,,	1,815	2,960	692	22,635	23,524	10,584	13,178	51,796	7,102	184,477	351,132	163,373
Glycerine:												
Crude .. .. ,,	2,745	6,561	139	4,379	25,034	27,690	8,208	19,845	500	20,400	94,650	334,072
Distilled .. .. .. ,,	4,645	59	—	9,923	7,455	458	47,495	1,356	—	89,032	45,426	9,088
Potash Compounds:												
Saltpetre (Nitrate of Potash) ,,	39,757	34,954	14,860	224,352	204,217	121,813	82,533	74,888	27,950	469,690	429,392	247,703
Other Sorts .. .. .. *Value* £	—	—	—	—	—	—	17,094	66,380	32,195	195,011	204,681	173,712
Soda Compounds .. .. *Cwts.*	4,860	13,670	4,468	43,239	58,291	18,070	18,355	58,094	15,208	143,955	240,312	81,335
Tartaric Acid .. .. .. ,,	301	1,840	1,415	11,972	11,615	6,582	5,663	28,198	27,175	158,047	173,090	107,470
Unenumerated, including Acetate of Lime, Acetone, Muriate of Ammonia, and Sulphuric Acid .. .. *Value* £	—	—	—	—	—	—	857,590	2,243,763	338,206	3,527,008	11,421,477	2,670,594
DRUGS AND MEDICINES:												
Bark, Peruvian .. .. .. *Cwts.*	2,839	4,102	608	15,531	20,713	37,821	24,301	37,330	4,235	97,784	157,186	199,196
Quinine and Quinine Salts .. *Ounces*	569,604	704	1,335,672	2,414,345	1,253,669	3,437,912	63,206	230	124,555	270,426	168,806	325,259
Unenumerated .. .. .. *Value* £	—	—	—	—	—	—	200,098	223,998	357,342	1,405,942	1,539,663	1,918,115
DYE STUFFS (other than DYE WOODS) and SUBSTANCES used in Tanning or Dyeing:												
Dye Stuffs:												
Cutch .. .. *Cwts.*	3,587	3,800	1,160	25,878	25,787	24,812	6,757	8,751	2,625	49,488	63,024	72,739
Dyes and Dye Stuffs obtained from Coal Tar:												
Alizarine and Anthracene Dye Stuffs .. .. *Cwts.*	—	344	207	16	1,535	1,997	—	677	220	580	1,983	2,193
Aniline and Naphthalene Dye Stuffs .. .. ,,	3,937	3,725	5,813	33,633	28,763	26,051	145,481	143,302	173,862	1,047,723	1,027,245	851,982
Synthetic Indigo .. .. ,,	1,557	—	—	10,761	597	2,058	23,695	—	—	153,341	9,645	18,803
Other Coal Tar Dye Stuffs ,,	—	—	34	65	123	416	—	—	1,671	2,420	1,868	15,271
Extracts for Dyeing .. *Value* £	—	—	—	—	—	—	116,377	35,198	30,636	653,027	384,961	366,377
Indigo .. .. .. *Cwts.*	824	1,444	267	11,897	4,060	2,960	47,327	67,025	12,696	648,796	204,290	141,178
Unenumerated .. .. ,,	7,952	18,010	11,608	110,719	110,343	103,432	27,042	63,481	43,313	365,503	479,592	474,187
Tanning Substances:												
Bark, for Tanning .. .. *Cwts.*	6,761	49,598	43,119	125,591	407,940	225,481	6,268	54,712	32,229	113,052	385,776	185,222
Extracts for Tanning .. *Value* £	—	—	—	—	—	—	95,532	300,683	347,207	930,254	1,327,372	1,319,788
Gambier .. .. .. *Cwts.*	603	7,520	1,742	63,034	67,038	42,275	1,652	37,610	3,389	165,819	231,557	110,842
Myrabolans .. .. .. ,,	17,262	95,850	21,569	229,431	404,980	193,602	17,372	105,484	14,748	192,793	425,930	145,551
Sumach .. .. .. ,,	5,620	—	7,063	52,487	45,581	28,335	4,811	—	7,441	37,512	45,623	29,996
Valonia .. .. .. ,,	10,000	—	24,551	11,140	88,731	67,706	20,000	—	28,321	22,280	198,082	91,269
Unenumerated .. .. ,,	236	18	2,023	1,768	2,160	24,663	1,079	164	1,862	3,414	4,518	36,863
PAINTERS' COLOURS AND PIGMENTS:												
Barytes .. .. *Cwts.*	200	—	55,153	27,143	13,004	256,563	85	—	32,383	9,016	8,761	170,161
Nickel Oxide .. .. .. ,,	—	—	1,010	14,777	15,500	7,518	—	—	5,782	83,329	85,727	50,873
Red Lead .. .. .. ,,	60	—	—	2,345	—	102	200	—	—	5,492	—	190
White Lead .. .. .. ,,	1,078	—	19,817	35,816	4,597	47,486	2,407	—	49,040	77,460	9,448	115,987
Zinc Oxide .. .. .. ,,	9,723	233	34,745	138,559	42,101	59,373	28,291	978	99,844	410,580	130,700	170,580
Unenumerated .. .. .. ,,	21,740	11,618	51,211	173,805	121,559	223,941	61,810	38,861	107,332	457,033	335,596	461,920
TOTAL OF CHEMICALS, DRUGS, DYES, AND COLOURS .. .. .. £							2,185,510	3,895,778	2,157,313	13,847,995	22,258,224	12,828,133

II.—EXPORTS (PRODUCE AND MANUFACTURES OF THE UNITED KINGDOM).

	QUANTITIES.						VALUE.					
	Month ended 31st July.			Seven Months ended 31st July.			Month ended 31st July.			Seven Months ended 31st July.		
	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.
J. CHEMICALS, DRUGS, DYES AND COLOURS:												
BLEACHING POWDER — To United States of America *Cwts.*	—	—	1,040	—	—	1,040	£ —	£ —	£ 900	£ —	£ —	£ 900
BLEACHING POWDER — ,, Other Countries .. ,,	1,142	4,946	18,816	31,832	31,164	218,132	1,354	3,796	14,010	21,897	25,161	183,008
BLEACHING POWDER — Total .. .. ,,	1,142	4,946	19,856	31,832	31,164	219,172	1,354	3,796	14,910	21,897	25,161	183,908
COAL PRODUCTS, NOT DYES:												
Aniline Oil and Toluidine .. *Lbs.*	61,922	171,373	13,959	1,021,349	1,487,000	802,707	3,797	9,973	881	71,334	91,056	47,386
Anthracene .. .. .. ,,	496,190	—	194,980	1,710,448	2,240	777,761	1,403	—	942	5,752	40	3,613
Benzol and Toluol .. .. *Galls.*	910,091	917,144	139,459	7,037,270	6,026,624	602,630	101,216	78,698	18,190	526 688	423,827	62,551
Carbolic Acid .. .. .. *Cwts.*	25,165	6,366	7,880	93,325	49,244	82,551	85,829	15,806	22,142	237,236	123,561	202,740
Coal Tar, Crude .. .. ,,	164	84	1,438	1,819	134	12,953	19	11	498	343	32	5,436
,, Refined and Varnish .. *Galls.*	209,257	52,538	258,473	1,736,848	722,022	1,915,364	5,479	1,619	10,293	42,697	20,469	79,150
Naphtha .. .. ,,	48,960	600	50,984	198,016	88,171	371,078	4,298	160	6,790	18,609	9,707	53,963
Naphthalene .. .. .. *Cwts.*	23,054	18,634	5,854	126,823	127,439	49,055	28,623	27,589	6,865	147,293	183,127	64,391
Pitch .. .. ,,	184,725	323,266	452,193	4,251,480	5,594,356	9,091,099	12,361	33,118	58,614	239,389	566,710	1,187,182
Tar Oil, Creosote, &c. .. .. *Galls.*	1,603,748	87,102	429,982	9,225,672	1,809,525	8,069,866	67,447	2,028	15,584	266,472	73,931	229,591
Other Sorts .. .. .. *Cwts.*	52,093	7,430	18,435	276,445	87,579	129,321	38,007	15,434	22,183	258,017	121,341	181,117
Total Value ..	—	—	—	—	—	—	348,479	184,436	162,982	1,813,830	1,613,801	2,117,120
COPPER, Sulphate of .. .. *Tons*	3,576	1,747	1,911	26,529	33,020	29,134	187,477	107,913	98,961	1,450,895	2,071,516	1,603,280
DYE STUFFS:												
Products of Coal Tar .. .. *Cwts.*	6,419	7,565	5,994	35,898	44,036	46,107	113,313	111,151	89,271	559,245	655,659	677,561
Other Sorts .. .. .. ,,	9,074	3,204	4,937	43,185	13,287	18,810	25,781	17,050	14,153	165,460	76,037	78,611
Total .. ,,	15,493	10,769	10,931	79,083	57,323	64,917	139,094	128,201	103,424	724,705	731,696	756,172
GLYCERINE:												
Crude .. .. *Cwts.*	7,980	2,381	629	19,063	11,961	4,806	26,334	7,863	2,095	63,361	39,761	24,241
Distilled .. .. ,,	7,882	5,301	4,750	45,457	28,750	27,075	34,969	24,181	29,354	204,069	130,126	166,528
Total .. .. ,,	15,862	7,682	5,379	64,520	40,711	31,881	61,303	32,044	31,449	267,430	169,887	190,769
MANURES:												
Sulphate of Ammonia — To France .. *Tons*	210	645	489	8,249	3,042	6,493	4,782	16,375	13,757	155,647	66,879	142,673
Sulphate of Ammonia — ,, Spain and Canaries .. ,,	—	—	623	5,015	—	4,385	—	—	19,897	89,865	—	152,147
Sulphate of Ammonia — ,, Italy .. ,,	—	850	172	4	1,851	2,429	—	24,648	5,074	57	45,671	83,085
Sulphate of Ammonia — ,, Dutch East Indies ,,	—	—	1,288	6,480	—	2,488	—	—	32,845	119,648	—	64,447
Sulphate of Ammonia — ,, Japan .. ,,	—	—	2,188	4,050	—	2,188	—	—	37,144	72,882	—	37,144
Sulphate of Ammonia — ,, United States of America ,,	—	—	—	1,513	—	—	—	—	—	27,177	—	—
Sulphate of Ammonia — ,, British West India Islands (including Bahamas) and British Guiana .. ,,	1,319	697	57	3,223	747	2,525	29,976	22,652	1,377	64,898	23,528	74,287
Sulphate of Ammonia — ,, Other Countries ,,	1,345	100	755	10,851	1,111	6,861	23,749	3,250	20,076	197,271	25,396	208,475
Sulphate of Ammonia — Total .. ,,	2,874	2,292	5,572	39,385	6,751	27,369	58,507	66,925	130,170	727,445	161,474	762,258
Superphosphates .. .. ,,	80	150	388	1,336	373	1,422	488	942	3,571	7,340	2,366	13,280
Basic Slag .. .. .. ,,	—	40	2,895	1,353	130	3,578	—	125	12,946	5,047	402	15,790
Unenumerated .. .. .. ,,	475	1,287	1,928	15,249	20,447	16,218	4,806	14,836	19,938	138,092	217,832	229,792
Total of Manures .. ,,	3,429	3,769	10,783	57,323	27,701	48,587	63,801	82,828	166,625	877,924	382,074	1,021,120
MEDICINES, comprising DRUGS and MEDICINAL PREPARATIONS:												
Opium, dried and powdered in the United Kingdom .. *Lbs.*	2,632	6,739	385	7,307	59,822	25,656	4,583	24,585	1,351	17,951	224,710	97,291
Quinine and Quinine Salts .. *Ounces.*	52,460	69,708	365,232	899,338	252,510	833,331	7,957	10,387	45,979	124,730	41,927	123,007
Other Sorts .. .. .. *Value* £	—	—	—	—	—	—	257,611	240,819	306,184	1,771,089	1,530,014	2,285,915
Total .. ,,	—	—	—	—	—	—	270,151	275,791	353,514	1,913,770	1,796,651	2,506,213
MURIATE OF AMMONIA .. .. *Cwts.*	7,515	3,375	6,806	49,908	32,300	63,900	16,554	10,333	19,992	110,902	89,561	189,707
PAINTERS' COLOURS AND MATERIALS:												
Barytes .. .. *Cwts.*	5,114	422	1,265	40,220	26,271	21,364	2,178	305	902	17,744	13,401	15,338
White Lead .. .. .. ,,	4,700	979	12,731	86,314	17,372	80,365	11,338	2,859	38,204	212,783	46,055	247,476
Zinc Oxide .. .. .. ,,	1,049	338	1,924	15,061	1,316	14,972	3,205	1,075	7,608	45,451	4,612	58,121
Unenumerated .. .. .. ,,	68,077	38,248	87,835	588,377	252,676	623,002	194,117	100,074	323,495	1,530,121	803,193	2,273,964
Total .. ,,	78,940	39,987	103,755	729,972	297,635	739,703	210,838	104,313	370,209	1,806,099	867,261	2,594,899
POTASH COMPOUNDS:												
Saltpetre (Nitrate of Potash) British prepared .. *Cwts.*	796	1,330	1,426	5,607	9,812	18,452	2,626	4,364	4,089	16,959	31,162	57,541
Chromate and Bi-chromate of Potash .. .. ,,	487	1	902	3,972	1,474	2,969	3,634	648	8,309	28,206	16,712	30,219
Other Sorts .. .. .. *Value* £	—	—	—	—	—	—	5,983	3,406	3,807	44,411	18,125	22,714
Total .. ,,	—	—	—	—	—	—	12,243	8,418	16,205	89,576	65,999	110,474

II.—EXPORTS (PRODUCE AND MANUFACTURES OF THE UNITED KINGDOM)—*continued.*

	QUANTITIES.						VALUE.					
	Month ended 31st July.			Seven Months ended 31st July.			Month ended 31st July.			Seven Months ended 31st July.		
	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.
							£	£	£	£	£	£
Soda Compounds:												
Soda Ash .. .. .. *Cwts.*	358,956	222,009	336,309	2,083,830	1,577,591	2,085,841	106,027	76,772	105,086	621,660	492,803	704,467
,, Bicarbonate .. .. ,,	52,265	36,159	39,579	300,807	247,593	313,819	18,877	23,193	18,075	104,998	113,472	156,726
,, Caustic .. .. .. ,,	44,809	67,418	65,514	213,084	264,093	483,157	61,821	95,301	70,534	259,669	420,220	682,735
,, Chromatic and Bichromate ,,	10,479	5,024	3,506	53,718	48,832	34,742	33,839	12,508	10,865	164,526	155,937	98,525
,, Crystals .. .. .. ,,	3,654	409	7,928	67,456	11,446	137,697	1,184	174	2,538	19,617	5,275	46,112
,, Sulphate (Saltcake) .. ,,	49,870	54,999	29,992	269,443	281,007	183,663	7,326	9,588	6,587	35,885	49,682	34,685
,, Other Sorts .. .. ,,	27,439	45,184	41,732	315,930	328,965	325,042	30,426	61,605	44,838	242,535	307,292	412,569
Total .. ,,	547,472	431,202	524,560	3,304,268	2,759,527	3,563,961	259,500	279,141	258,523	1,448,890	1,634,681	2,135,810
Sulphuric Acid .. .. .. *Cwts.*	288	2,730	4,060	16,656	15,237	13,485	569	3,329	3,971	19,267	23,961	18,852
Tartaric Acid .. .. .. ,,	1,593	153	712	8,760	2,520	5,545	24,756	2,319	11,715	124,274	39,866	90,818
Chemicals, other sorts .. .. *Value £*	—	—	—	—	—	—	522,671	600,377	372,475	2,809,360	3,360,589	2,793,821
	—	—	—	—	—	—	2,118,790	1,823,239	1,984,955	13,478,819	12,872,704	16,312,972

III.—EXPORTS, FOREIGN AND COLONIAL MERCHANDISE.

J. CHEMICALS, DRUGS, DYES AND COLOURS:												
Chemicals:												
Boracite, Borate of Lime, Borate of Magnesium and Borax .. *Cwts.*	—	366	1,008	1,215	666	3,932	£ —	£ 1,124	£ 2,041	£ 1,822	£ 2,344	£ 6,570
Coal Products, not Dyes .. ,,	—	—	—	1,328	305	868	—	—	20	11,195	5,210	15,364
Cream of Tartar .. .. ,,	691	568	102	3,602	4,419	3,527	5,600	9,009	1,347	30,479	54,005	60,410
Glycerine:												
Crude .. .. ,,	—	—	—	—	—	10	—	—	—	—	—	150
Distilled .. .. .. ,,	—	—	—	—	—	—	—	—	—	—	—	—
Potash Compounds:												
Saltpetre (Nitrate of Potash) ,,	11,350	—	—	22,734	36,311	5,520	22,711	—	—	46,448	76,445	11,651
Tartaric Acid .. .. .. ,,	57	4	274	1,938	523	1,183	961	77	4,923	28,859	8,006	21,170
Of all other Sorts .. .. *Value £*	—	—	—	—	—	—	92,304	75,396	35,588	323,927	434,115	1,179,115
Drugs and Medicines:												
Bark, Peruvian .. .. .. *Cwts.*	1,614	4,390	3,509	8,150	9,452	12,741	15,753	40,694	26,796	52,964	89,082	93,322
Quinine and Quinine Salts .. *Ounces*	18,215	458,954	212,210	70,368	954,411	1,484,781	3,346	54,999	20,294	10,786	111,107	169,632
Unenumerated in Import List.. *Value £*	—	—	—	—	—	—	56,791	58,436	129,358	477,341	416,888	1,003,148
Dye Stuffs (other than Dye Woods) and Substances used in Tanning or Dyeing:												
Dye Stuffs:												
Cutch .. .. *Cwts.*	1,224	100	3,595	19,529	2,664	18,598	2,797	385	8,824	43,591	6,851	54,451
Extracts for Dyeing .. *Value £*	—	—	—	—	—	—	5,285	13,014	2,362	70,110	89,402	112,586
Indigo .. .. .. *Cwts.*	620	438	94	8,126	3,968	368	29,384	20,730	4,054	427,147	192,571	18,380
Tanning Substances:												
Bark for Tanning .. .. *Cwts.*	400	—	16,227	11,790	4,992	81,027	310	—	14,877	8,142	5,398	72,880
Extracts for Tanning .. *Value £*	—	—	—	—	—	—	—	—	35,685	94,307	90	132,481
Gambier .. .. .. *Cwts.*	600	—	1,488	9,907	656	10,454	2,100	—	3,237	24,491	2,097	23,520
Myrobalans .. .. .. ,,	—	—	9,157	761	4,460	48,638	—	—	8,279	556	4,749	49,279
Sumach .. .. .. ,,	—	—	619	197	—	2,424	—	—	689	196	—	2,744
Valonia .. .. .. ,,	—	—	3,861	—	—	5,183	—	—	9,042	—	—	11,443
Unenumerated .. .. ,,	25	—	4,390	2,285	—	8,456	65	—	4,790	2,283	—	10,585
Painters' Colours and Pigments ,,	1,283	511	1,834	21,474	1,359	8,414	4,888	2,344	5,125	62,703	8,141	34,339
				Total of Chemicals, Drugs, Dyes and Colours £			281,800	285,617	330,175	1,964,611	1,722,997	3,252,145

Synthetic Ammonia

In a recent number of *Comptes Rendus*, Mr. G. Claude points out that now the war is over the problem of the production of nitrogen is of very great importance. He describes results obtained by him after two years of research, which should be of great advantage when applied to the direct synthetic production of ammonia. He believes the results have not previously been known. In times of peace the chief object of the fixation of nitrogen is for the production of fertilisers; a process, therefore, which produces ammonia should be completed by some method of combining the ammonia, which is not easily transportable into some product easily portable and of service directly as a fertiliser. With the exception of the transformation into nitrate, which is the most rational method, the only means yet considered either for ammonia produced from cyanamide, or that resulting from direct synthesis, is the classic transformation into the sulphate; but this needs enormous quantities of expensive sulphuric acid, which has no value as a fertiliser. Only in Germany has attention been given to a French process for lessening the cost of transport by obtaining the necessary sulphuric acid from gypsum. If one can credit the statements made by German engineers, it was on these lines that they were working. However, the *sulphate* of ammonium is not the only salt capable of use as a fertiliser; the research of Georges Ville has proved that the chloride is at least as valuable, while its smaller weight for a given volume of contained nitrogen renders its transport cheaper. It is suggested, therefore, to produce chloride of ammonium synthetically. If this merely meant that hydrochloric acid be substituted for sulphuric acid, the result would be of secondary importance; but it is quite otherwise. In the manufacture of soda by the ammonia process, a given quantity of ammonia transforms indefinite quantities of sea salt and of carbonic acid into carbonate of soda; the chlorine of the sea salt combining at first with the ammonia is, after the regeneration of the latter by lime, transformed into chloride of calcium, which is lost. But if by the synthetic process indefinite volumes of ammonia were available, instead of merely a given volume which had to be regenerated and re-used, then the process could be stopped at the production of chloride of ammonium and bicarbonate of soda. The desired end would then have been attained, to transform the ammonia into an easily portable form which can be used as a fertiliser, but by the use of the chlorine of sea salt, instead of by employing sulphuric acid. The present by-product, chloride of calcium, would not be produced, and for each ton of nitrogen fixed there would result three tons of carbonate of soda as a by-product. (*Technical Supplement of the Foreign Press.*)

Reviews

EXPLOSIVES. By E. DE BARRY BARNETT, B.Sc., A.I.C. Bailliere, Tindall & Cox, London. Pp. xvi, 241. 12s. 6d. net.

THE function of some books seems to be that of incentor; that is, the reader finds part of something he wants or thinks he can make useful, but misses the needful detail, and is therefore compelled to search farther. It is a quite useful function, and this little volume performs it. It begins with the inevitable historical sketch. It is very short, and the first thing one notices is the credit given to the Chinese for the invention of gunpowder. Why, in face of the evidence against the Chinese produced by Colonel Hime, and the positive evidence that Roger Bacon really was the first to invent gunpowder, *an explosive*, undoubtedly because he was the first to purify nitre, is very difficult to understand. Incendiary compositions were used before Bacon's day, but his powder was the "first" explosive.

The introduction continues with a classification of explosives which may be useful, but, in spite of the authority of the "List of Authorised Explosives," the term "fulminate" should be restricted to mercury fulminate. Also we have ceased to use the word "sulphuret" for sulphide. The sections into which the matter is divided comprise gunpowder, explosive compounds, smokeless propellants, blasting explosives, safety coal-mine explosives, detonators, pyrotechny, and other details. A valiant attempt has been made to get everything connected with the explosives industry mentioned, at least, and in many cases more than mentioned—the whole story is shortly described. With our forty years' experience of explosives, many of these accounts of explosives, manufacture, properties, &c., are refreshingly short. It might not be the same for an ordinary reader, but, fortunately, at the end of each section "literature" references are given, which are really valuable. This fact justifies our opening remark.

There are some errors, of course, in a concentrated conglomerate, but no very serious ones. The section on Safety Coal-mine Explosives should be widely useful.

W. R. H.

THE METALS OF THE RARE EARTHS. By J. F. SPENCER, D.Sc., Ph.D., F.I.C. Pp. vii, 279. Longmans, Green & Co.

THE purpose of this volume is to give to the student during his college career some knowledge of the rare earths, in view of the commercial and economic importance attained by these substances. In the light of this relatively modest aspiration, the work is in every way an excellent one for the purpose. The subject-matter has on the whole been judiciously chosen, and is, with a few exceptions, accurately stated.

There are one or two points in the text which should be corrected as opportunity arises. For instance, the double magnesium nitrate process (p. 28) is due to Demarçay, and not to Drossbach. The double magnesium nitrate method (p. 31) was originated by Lacombe, and not by James. The author is in error in stating that thorianite (p. 15) was the chief source of thorium prior to the discovery of monazite, or even of monazite sand, for the mineral monazite was described as early as 1823. In several places the properties of ceric as distinguished from cerous salts have been given without any clear statement as to the state of oxidation of the cerium, *e.g.*, the solubility of the oxalate in ammonium oxalate (p. 37). A similar ambiguity occurs on page 44, where the practical importance of the basic ceric nitrate separation is not clearly recognised, and the work of Wyrouboff and Verneuil and of Sterba on the process is overlooked.

Generally speaking, the analytical methods described, particularly those of thorium, are not sufficiently detailed for the use of the student, and the vital importance from the scientific aspect of the separation of the elements by fractional crystallisation and of the bearing of the X-ray spectra on the question of the homogeneity of the elements themselves has not been recognised. It is curious to note that Welsbach's original use of lanthanum as a separating element is overlooked, although Scheele's use of cerium for the same purpose (separation of praseodymium and neodymium as double ammonium nitrates) is described (p. 28).

One realises the very great difficulty which the author of a book of this character has in obtaining reliable information with regard to the technology of the subject. At the same time, in order to render the matter interesting to the student for whom the book is intended, a fuller discussion of the technical importance of these elements seems desirable; particularly, monazite sand in its technical aspect deserves more consideration by the author, who is apparently unaware that the crude sand is now concentrated electro-magnetically until it contains from 90 to 96 per cent. of monazite, and not 65 to 75 per cent., as he states, and that sand of commercial quality contains from 6 to 10 per cent. ThO_2, and not 4 to 5 per cent. (p. 161).

Notwithstanding its few blemishes, the book is a very useful production, and should be of considerable service to chemical students. It is well indexed, and contains a very useful bibliography of 1,029 references, also well indexed.

C. S. G.

VOLUMETRIC ANALYSIS. By CHARLES H. HAMPSHIRE, B.Sc. (Lond.), F.I.C. (Second Edition.) London: J. & A. Churchill, 1919. 5s. net.

THIS little book has been written especially for pharmaceutical students in the early stages of their training, but will also meet the requirements of most first-year students of analytical chemistry so far as volumetric methods are concerned. Those portions of the book which deal with analytical processes of general utility have been printed in large type, while those portions which deal with subjects of little interest to students not associated with pharmacy have been printed in small type. Some of the analytical processes which appear in the British Pharmacopœia are suitable only for the use of advanced students, and have, therefore, been omitted from the present volume.

Within the limits of the rather restricted field he has chosen the author has done his work satisfactorily. He explains briefly but clearly the functions of standard solutions and indicators, and points out common sources of error in conducting titrations. Without devoting excessive space to elementary information of this character, he proceeds at once to give examples of volumetric analysis. After describing the usual acid and alkali titrations, the author passes on to explain the methods of analysis which involve oxidation and reduction. The final chapters discuss precipitation reactions, such as the precipitation of insoluble silver salts by reaction between standard solution of silver nitrate and solutions of chlorides, bromides, iodides, cyanides, and thiocyanates.

The book contains only three illustrations. We do not observe any very novel feature in the author's method of dealing with his subject, but the book has the merit of being clearly and concisely written, and should prove very useful to all students who are taking a first course of instruction in volumetric analysis.

H.

The Advantages of Chloride of Potash over Sulphate of Potash

To the Editor of THE CHEMICAL AGE

SIR,—Sulphate of potash is being sold in Germany in two qualities, one containing 97.2 of sulphate (equal to 51.8 per cent. of K_2O), the other containing 90.6 of sulphate (equal to 48.6 per cent. of K_2O).

	Chloride of Potash.	Sulphate of Potash. 2nd quality	Sulphate of Potash. 1st quality
Pure Potash K_2O	50.60%	48.6%	51.8%
Chloride of Potash (KCl) ..	80.95	0.3	1.6
Sulphate of Potash (K_2SO_4) ..	–	90.6	97.2
,, ,, Magnesium ($MgSO_4$)	–	0.7	2.7
,, ,, ,, ($MgCl_2$) ..	–	0.4	1.0
,, – Sodium (NaCl) ..	4.18%	0.2	1.2
Sulphate of Calcium ($CaSO_4$) ..	1.2%	0.3	0.4
Insoluble	Insignificant	0.2	0.3
Water (H_2O)	0.5–1.5%	0.7	2.2

Chloride of potash thus contains a little more pure potash than sulphate, which has a certain advantage from the point of view of freight over long distances. Moreover, chloride of potash does not contain any salts of magnesium ($MgCl_2$) and $MgSO_4$, which easily absorb moisture; it is easier to transport and has better keeping qualities. The salt (NaCl) contained in chloride in a moderate proportion (4/18 per cent.) is also a great advantage for all the soils, yielding considerable quantities of potash in non-soluble combinations. Indeed, this salt is active enough to dissolve the potash contained in such soils and to enable the plants to assimilate it. This is a well-known fact, and has of late been confirmed by Mr. D. K. Tressler (Bureau of Fisheries, U.S.

Department of Commerce) in his essay published in *Soil Science* (Vol. VL, No. 3, pp. 237-257; Baltimore, 1918).

The introduction of chloride of sodium into the soil may, therefore, be considered an indirect kind of potash manuring. It may be added that sodium (Na) can to a certain extent replace potash in some plants, and that considerable quantities of sodium are indispensable for beet and sugar beet, for which reason these plants are sometimes manured with salt when this mineral has not already been applied with the usual artificial manures. It is seen that chloride of potash contains only beneficial matter; sulphate of calcium can even increase the solubility of potash in certain lands.

Sulphate of potash, apart from the disadvantages already stated, has the added defect that it leaves in the soil considerable quantities of sulphuric acid (H_2SO_4), owing to disaggregation and the absorption of potash by the plants. This sulphuric acid may be harmful, especially in soils that are poor in lime and badly aerated, and worse still on land suffering from both these defects. Chloride of potash is cheaper per unit than sulphate of potash, which is one more point in favour of the former.

As to the application of potash for the manuring of cotton plants, the Kali Syndicate have stated in a pamphlet that the United States themselves prefer the natural salts for such manuring, which proves that neither the chloride nor the sodium, found in natural salts, has a harmful effect on the cotton plants. Coffee trees may be manured with chloride of potash without hesitation, and for this purpose the latter is in every way equal to sulphate of potash.

For the manuring of tobacco and cane sugar, chloride of potash is inferior to sulphate *only* when it is applied very late—viz., shortly before planting. When chloride is applied a few months, or at the latest seven to eight weeks, before planting time, it is in every way equal to sulphate. All potash manures, sulphate included, should be applied before the sowings, so that the land may experience the full effect of the cultivation preceding the sowings; in this way the potash will penetrate uniformly into the soil.

As to fruit trees, such as lemon, orange, banana, &c., chloride of potash is fully equal to potash on condition that it is applied some time before the plants push through the soil in the spring. A special testimonial in favour of chloride has been given by the Kali Syndicate, which says in a pamphlet published last year:—"The farmers abroad are restricted to the use of chloride of potash, which *can be applied to most plants* and can be carried at low freights over long distances on account of its high percentage (50-60 per cent.) of pure potash."—Yours, &c.,

A FRENCH READER.

Solution for Cleaning Glass Skylights

The Cannon Iron Foundries, Ltd., Deepfields, near Bilston, Staffs., write:—"We are wanting an effective solution for cleaning glass skylights. We have tried solution of soda ash, ammonia, and muriatic acid, but they are not satisfactory, possibly it is because the roof we want to clean is adjacent to a Dowson gas plant, and may be affected by the fumes. It has occurred to us that a note in your journal might result in establishing communication between ourselves and the makers."

South Metropolitan Gas

Chemical By-Products Output

AT the ordinary half-yearly general meeting of the South Metropolitan Gas Co., held at the Cannon Street Hotel, on Wednesday, the chairman (Dr. Charles Carpenter) reviewed the position at considerable length.

Over-Seas Chemical Trade

After referring to the national need of gas undertakings and recommending the application to the industry of the sliding scale principle, he remarked that an extension of the hardships under which the company were working by the restriction of their over-seas chemical trade was surely unjustifiable.

Of our by-products other than coke, he said, ammonia was, before the war, the most valuable, and we exported nearly all we produced. Some years before the war we were aware that Germany was producing in increasing quantities an artificial product of the highest quality, and we realised that to compete we should have to work up to an equally high standard. We have spent much time and money in achieving this, and looked forward to the cessation of hostilities to commence again our valuable export trade. But one of the many Government controls—necessary during the war, but so loth to take the opportunity peace provides of returning to their pre-war callings—declined to issue to us an export licence unless we would join a "pool" and do the business through its machinery. But for the surprises of the war, this would seem an incredible attitude to be adopted by a Department of the Government, which certainly has no mandate to encourage trusts. I think they are a very dangerous weapon for Government officials to play with, and that, whatever restrictions may be necessary as to imports, the sooner restrictions with regard to exports are removed from goods manufactured in Great Britain and not required by her inhabitants, the better it will be for her and her industries.

You will observe from the balance-sheet that our stock of chemical products stands at nearly a quarter of a million pounds. It would be much better realised and in the country's coffers. I ought to add that dealings in other ammonia compounds than the particular one in which we are interested, though their basic value is the same, are entirely unrestricted. The suggestion has been made that this is due to the necessities of agriculture. It is quite true that ammonia is required as a fertiliser, and to a greater extent than has ever been the case before, and it is, of course, essential to provide that a certain proportion of the ammonia produced is reserved for consumption in this country. Now, there are statistics of the whole of the producers of ammonia, and the amount of ammonia which they produce is known to a ton, and it would be a perfectly easy thing to give to every producer an export licence for whatever the amount may be—the difference between what is required for the country and the total produced. The balance could be exported, and it could be done in the simplest possible manner. I should think that a clerk in one of the Departments could do the whole of the business at an expenditure of a few pounds a year; but the method is extremely unpopular, because it is in the hands of a Department which does not want to revert to the pre-war state of things. It is a very serious matter to us, because instead of being able to sell these products, thereby enabling us to use the money in our business, we have to borrow largely from the bank in order to make up the difference.

Dr. Carpenter went on to discuss in detail the recommendations of the Beilby Report. Dealing with the coal question, he remarked: Whatever conditions may be applicable to that wrongly-handled industry, I sincerely hope we shall hear no more about its nationalisation. Mining rights might, however, well be transferred to the State, and leased by it to statutory undertakings, such as we are, formed for the purpose of exploiting the principal fields. The mine workers, both above and below ground, should be co-partners with the capitalist in the respective undertakings and with him should have a voice in the management. It is a curious example of the unwisdom of political prophecy to remember that the ruin of the coal industry was declared to be inevitable when a tax of one shilling per ton was levied by the late Lord Salisbury's Government upon coal sent abroad in order to provide money for the Navy. I hope the day has gone never to return when we exported our best coal at the same price as that charged to users at home. We are to-day faced with a still further extension of our coal difficulties in the announcement that has been recently made of an increase of 6s. per ton in the price of coal. We hear a great deal to-day about profiteering. When the time comes, as I have no doubt it will between now and Christmas, for us again to raise our price, I hope our friends will remember that that action will not deserve to be branded as one of profiteering, if they remember that we are getting six-elevenths of the very moderate pre-war dividend.

Dividends were declared of 5 per cent. on the 5 Per Cent. Redeemable Preference Stock, and of 3 per cent. on the Ordinary Stock.

British Glass Industries

The Need of Developing Home Trade

AT an extraordinary general meeting of British Glass Industries (Limited) last week, the chai man (Mr. C. Williamson Milne), in reviewing the position of the Company, said that for many years past the manufacture of glass and glassware had been very largely in the hands of foreigners. With all the materials necessary for the manufacture of glass available in unlimited

quantities and at economical prices in this country, or at our very doors, it was surprising how supine and indifferent we had been as a nation in allowing important industries to drift away from our shores.

In pre-war days, he said, the vast majority of bottles used in the British Isles was imported, with the result that since the outbreak of war there has been a positive famine in bottles and glass jars of every description. To-day the shortage is more acute than ever, and I venture to predict that even with the vast output which we contemplate, we shall, for years to come, have far more orders on our books than we shall be able to cope with. This company, as you know, was originally formed for the purpose of taking over two factories—one at Leeds, and the other at Canning Town, London, in order to develop on a much larger scale the process of making bottles, jars, and other glassware by automatic machinery, which had already been successfully carried out at these two places. Great extensions and developments have taken place at the works at Canning Town, where it was originally intended to install 20 furnaces with a weekly capacity of about 50 to 60 tons each. This programme was subsequently slightly modified by a decision of the directors to install 10 furnaces of a larger type, the output of which would be equivalent to that contemplated from the original 20. However, the demand for the company's product is so great that it is quite probable that this programme may be extended in a short time, and that the directors may arrange for additional furnaces of a larger type. With regard to our technical staff I think we may congratulate ourselves upon now having got together a combination of thoroughly qualified men. The result of their joint labours so far has been the improvement of certain types of automatic machines which the company is installing, while improvements in detail are constantly being made. The whole scheme which we have in hand is exceptional, and I think I am safe in saying unequalled, by anything which has hitherto been attempted in the way of glass manufacture in this country.

Acquisition of Important Interests

The chairman mentioned that one object in calling the shareholders together was to increase capital by a further 300,000 shares of £1 each, and it was proposed to offer the new shares share for share to the existing shareholders at the price of £2 10s. per share—that is to say, at a premium of 30s., thereby raising for the company the additional capital sum of £750,000, less underwriting commission.

Dealing with the purchases for which this additional capital is required, the chairman said, we have secured the whole of the shares of the Queenborough Glass Bottle Works (Limited), and the business of the British and Foreign Bottle Company, both of which companies have had a most successful career under the management of Mr. John R. Payne and his brothers, and have earned very large profits. The earnings from these companies alone at the present time, and under present conditions, would, if fully distributed, be sufficient to provide a substantial dividend on the present share capital of British Glass Industries (Limited), and it is confidently expected that with the installation of our latest automatic machines, which have been ordered for the Queenborough Works, these profits will be considerably increased in the future.

In addition to these two businesses, the directors have acquired 300,000 eight per cent. cumulative participating preference shares of £1 each in the British Window Glass Company (Limited), Basing the profits of that company on those made at similar works in Belgium—works operating, I may say, under more difficult conditions than exist here—the annual revenue which should be derived from our holding in this Company alone should amount to £100,000, after completion of the works, which are to be laid down in the neighbourhood of our own works at Queenborough. This expectation is based on the operation of one unit only, whereas it will be seen by a reference to the prospectus of the British Window Glass Company (Limited) that it is the intention of that company to increase their works eventually, when their profits, in which we shall share, should be still further augmented.

Having in view all the great improvements in the machines we are now in a position to contract for the sale of the whole of our output for many years ahead at very remunerative prices and on a sliding scale, to provide for the possibility of additional cost of material and labour. At the present moment negotiations are proceeding with two important firms, who are anxious to enter into an arrangement to contract for the entire output, but the directors are now considering whether, in spite of the assured profit thus to be secured, it would be wise to enter into a binding arrangement of this sort. A contract, however, is about to be entered into for the product of the first series of furnaces to be erected, and any further arrangements in this direction will naturally be very carefully considered.

In addition to the automatic glass-bottle-making machines the company has acquired the sole rights for machines which automatically grind stoppers and bottles, thus introducing another important set of labour-saving machinery in connection with the glass industry. All old methods have been altered by these ingenious machines, which turn out accurately ground bottles and stoppers, interchangeable for the same sizes. By the installation of these grinding machines the factory will, we are assured, be able to produce as much ground-stoppered ware for the payment of £10 in wages, as it could have accomplished for well over £100 in wages for the same amount of work done by existing methods. The demand for our products is practically unlimited, and, as I have already said, this demand has hitherto been almost entirely supplied from abroad.

The resolution authorizing the increase in capital having been passed, the chairman in reply to questions, said their idea was to confine the manufacture of pure white bottles to Queenborough, and coloured bottles to Canning Town. The only glass which they were not going to make and did not expect to make was "cut glass."

American Chemicals for Europe

An American Chemist's Forecast

Discussing the chemical situation in Europe and the prospect of American producers getting into European markets, Mr. Henry Wigglesworth, of the General Chemical Co., states that in regard to the opportunities for American trade in Europe in drugs, chemicals and dyes, it is safe to say that the various governments will resist granting licences for any product, be it raw material or finished article, if there is even a prospect of its being purchased from the United States, to whom Europe is now so financially indebted. The chemical buyers would naturally prefer to deal with America rather than with Germany, the leader in the worlds' chemical industry, but the difference now in exchange alone constitutes a 40 per cent. handicap. "I believe, therefore," he says, "that the prospects of doing chemical businesses in Europe are more unfavourable than for years past and that the factors operating against us can only be overcome by increased efficiency on our part.

"The war has caused Europe to suffer more than the United States in the labour market, and as they have less experience in the employment of labour saving devices and other industrial economies, they will find it more difficult to keep down the labour cost in the finished article. This, of course, will operate to our advantage and help to equalize the handicap we labour under while exchange is against us. A natural corollary to this situation, of course, exists in Europe's determination to do a maximum business with the United States to restore their financial equilibrium, and corrective measures, such as the licensing system for dyes, become obligatory if we are to sustain, against competition that might well be deadly, industries which have during the war sought to establish themselves.

"The Longworth Bill, now before the Ways and Means Committee, proposes to accomplish this by the creation of a Dye Licensing Commission, to be composed, in the language of the Act:

Of eleven commissioners who shall be appointed by the President. Five of said commissioners, hereinafter designated as the manufacturers commissioners shall be persons thoroughly familiar with and expert in the manufacture of coal-tar products, of whom three shall be persons actively engaged in the manufacture of coal-tar dyestuffs. Five of the said commissioners, hereinafter designated as the consumers' commissioners, shall be persons thoroughly familiar with and expert in one or more domestic industries which habitually consume coal-tar products, of whom one shall be a person actively engaged in the business of manufacturing cotton goods, one shall be a person actively engaged in the business of manufacturing woollen goods, and one a person actively engaged in the manufacture of silk goods. The remaining commissioner shall be a person not actively connected with any industry which either manufactures or consumes coal-tar products and shall be the chairman of the commission.

The said Dye Licensing Commission shall issue licences to i port any materials, products and articles covered by section 503 (a) of this Act which may reasonably be required to supply any then current consumptive demand substantially greater in extent than or different in character from the products of the then current domestic production. Licences shall be granted to import in the quantity actually requ r d for use in manufacture within the United States such materials, products and articles and such only, as may, in the judgment of the commission, be unobtainable from domestic sources on reasonable terms as to rice, quality and delivery. It shall be the duty of the commission to limit the licences granted by it in such a manner and by the imposition of such conditions as, in their judgment, may without injuring the domestic consuming industries, best serve to aid in the building up of a complete and self-sustaining domestic manufacture of coal-tar products, dyestuffs and allied products.

"As a similar licensing system is in force in England and likely to be adopted in France and Italy, it is obvious that we would be opening the door to dumping, not only by Germany, but also by England, France and Italy, unless some such measure be adopted. It calls, therefore, for general consideration and enthusiastic support if it establishes conditions for fair play to all concerned. Sooner or later the factors of exchange must be restored to their normal relationship and naturally each European nation aims to restore it with the least possible delay. There is a point at which dumping goods into the United States will pay at any price, for the restoration of exchange justifies some direct loss, especially when counterbalanced by higher prices to nations other than the United States. No one can foretell precisely the fluctuations that will occur during this process.

"The Webb law offers an unusual opportunity to establish export associations to keep intimately in touch with the rapidly changing European conditions, for it may well be that even the largest corporations cannot cope with such world-wide disturbances. By joint action each industry or trade can inaugurate a united policy for its own protection, and if these policies fail it will be easier to appeal to the Government in a body for better support.

"The Europeans are worse off than are we, for they are hampered with debt, and their labour population is less conciliatory and more persistent in unreasonable demands than our own artisans. No one can predict future developments precisely, but the Europeans are less likely to work together, and, therefore, are more dependent upon their governments for promotion and support."

Norfolk Oil Developments

In describing his impressions of a two-days' tour of the Norfolk oil shale field, a correspondent of the *Times* gives some particulars of the policy which is to be carried out in regard to the commercial development of the deposits.

The mining of the shales (he says) on a commercial scale has already been begun by the sinking of a shaft at West Winch, which is to have an output of 500 tons of shale daily. A second shaft is to be put down some few hundred yards distant, and the combined output of these will be aerially conveyed to the retorting plant situate at Setchey. There the first of an improved kind of brick retort has been completed, and its fires were lighted for testing purposes last week. A series of such retorts is to be erected as soon as possible, and the material for them is already on the ground.

Sites have already been chosen at Blackborough End, Narborough, Runcton Holme, Shouldham, Wimbotham, and Tottenhill for similar retorting plants, and these will be fed by the oil shales obtained from shafts in the immediate neighbourhood, all this widespread area having already been proved to contain the same numerous oil shale seams as are met with in the West Winch shaft.

The chief refining plant for treating the resulting crude oil from the destructive distillation of the shales is to be erected at Stow Bridge, on a site lying between the Ouse (which is here navigable) and the main Great Eastern line from King's Lynn to London. The crude from the retorts will be conveyed by pipelines from the various plants to the central refinery, the pipes varying in length from one mile to nearly seven miles. Suitable storage accommodation will be constructed at Stow Bridge, but many of the more valuable refined products will be taken down the Ouse to a central depot at Purfleet Quay, King's Lynn.

The whole of the mines and retorting plants will be connected with the Great Eastern Railway by a special line, which will leave the main line just south of King's Lynn at St. Germain's Junction, and its total length will be approximately twenty-one miles. At Setchey the line will divide, for while one portion will proceed to West Winch, where, apart from the first retorting plant, a brickfield is to be operated, the other section will run to the various mining and retorting centres already enumerated.

The concern which is responsible for the development of these shale areas in Norfolk is showing considerable activity in its operations at various points. At West Winch, for instance, numerous workmen's dwellings have been completed, while the finishing touches are now being given to a laboratory. A staff of nearly 200 is regularly employed, and it is anticipated that in the near future this will be but a fraction of the regular workers.

Though sixteen test bores have been completed in various parts of the shale areas, others are to-day either being drilled or decided upon. The most recent one to be started is that at Warmegay, and it is here that a few days ago free liquid shale oil was met with at first at a depth of 28 ft., and later at from 58 ft. to 58.6 ft. The chief driller's log of the well at these latter depths states:—"Liquid shale oil running out fast. Drilling stopped to shut off percolation." This liquid shale oil must not be confused with ordinary crude oil, which differs both in colour and content. It is evidently a superabundance of hydrocarbon which the porosity of the shale beds has been incompetent to take in.

Another remarkable discovery has been made at the test well which was being drilled at Stow, almost on the southern fringe of the defined shale area, and north of the town of Downham Market. Here the oil shales at a depth of about 130 ft. became of a richness approaching ozokerite, such as is mined in Galicia, but from their appearance even richer. The ozokerite seam at greater depth became particularly waxy in nature, and this continued until, when the drill was down over 200 ft., the core barrel became so wedged in this waxy formation that it was impossible to move the drilling rods. Thus further sinking was impossible.

Dr. Forbes-Leslie's Studies

Hitherto no competent geologist has given to the world any information concerning the geology of the Norfolk shale field; the information, therefore, which I have been able to obtain from Dr. W. Forbes-Leslie, F.R.G.S., who has spent several years in studying the geology of Norfolk (and who is responsible for bringing to light its wealth of oil shale), will be interesting.

Dr. Forbes-Leslie states that the Norfolk shale field, as now so clearly defined, consists on the western side of a series of Upper Oölite rocks, which as they pass eastward (and farther west) dip under the Upper Jurassic and Lower Cretaceous rocks, until, approaching East Norfolk, they are underlaid again by chalks. It is questionable, he asserts, whether the shale series exposed in West Norfolk will be found far eastward under the chalks, and a boring put down in Norwich to about 1,200 ft. failed to strike any shale series. As far as the Geological Survey of England has been carried out, these statements more or less correctly define the geological sequence visible by field work. More complicated questions, however, arise when drilling in Norfolk is carried out, for here is discovered the remains of two great glacial periods with an intervening period known in other parts of the world as the Champion period. The glaciers in both ages were of wide extent and cut deeply into the soft Oölite clays and shales. In some places these cuts are as deep as 400 ft. or 500 ft., and have widths averaging from 200 yards to a mile and a half. The main watersheddings of the glacial periods have been from the east and north-east, and the deposits which these great rivers have brought down during the whole of the Jurassic era have been responsible mainly for the oil shale beds and other deposits of West Norfolk.

The stratification of the oil shale series is perhaps more regular in sequence and thickness of beds and the regularity of dip than is found in any other part of the world. The shale seams have not been found to vary more than two or three inches over distances of from ten to twenty miles, which is quite unlike that which affects the coal measures of the United Kingdom, where varying thicknesses take place within a few hundred yards or even less.

The whole formation containing the oil shales in West Norfolk must have been laid down over a wide area, and been supported by very slow and regular quantities of deposit. The rise and fall of the land to the east of the shale areas must have remained at a stationary level for many ages. Only in such a case can the wonderful regularity in the thickness of the deposits and their character be explained. Likewise the oil contents of the shales themselves are as regular in quantity and quality as the thickness of the strata containing them.

From Week to Week

Several thousand tons of toluol and benzol are included in the items offered for sale by the Disposal Board.

A message from Rio de Janeiro, states that petroleum deposits have been discovered in the interior of the State of Bahia.

10,480 applications were received for the British Dyestuffs issue.

The recent article published in the CHEMICAL AGE on the Chemical Industry Club, has been reprinted, and makes an attractive pamphlet.

The International Sugar Committee has taken over most of the sugar in the West Indies, and only a portion of the crop will find its way to Europe.

The late Mr. Joseph Petraczek, of Charles Street, Bradford, analytical and consulting chemist, has left estate valued at £8,878.

The Minister of Munitions has suspended the Potassium Compounds Order, 1917; the Glass Control (Consolidated) Order 1917; and the Glass Control (Consolidated) Amendment Order 1918.

Arrangements are now being made for the annual meeting of the Chemical Industry Club towards the end of September. An album is being prepared, containing signed photographs of all the members of the club.

Mr. Bridgman, in a reply to Colonel Burton in the House of Commons, states that in 1917, the quantity of coal estimated to have been distributed to gas works was 18½ million tons; to electricity works, 7 million tons; and to chemical and allied trades, 5 million tons.

Two workmen were critically injured in an explosion of chemicals in the research department of the British Cellulose Company's works at Spondon, Derby. Prompt action by the works brigade confined the fire, which broke out, to a small area, and the damage was not serious.

Mr. Robert J. Smithson, a well-known Heckmondwike resident and a partner in the firm of Smithson and Gledhill, dyers and finishers, Ravensthorpe, died on Saturday, at the age of 65 years. He was one of the town's overseers, a member of the Education Committee, and an active worker in the Liberal cause.

Out of the 200 people employed at the Sheppey Blue and Chemical Works Queensborough, 180 are on strike. They are demanding a 48-hour week,and rates of wages varying from 1s. to 1s. 3d. per hour. On the hours question the firm is reported to have made concessions, but refuses to meet the wages demand.

The Birthday Honours announced on Wednesday include a baronetcy for Lieut-Colonel Alexander Leith, director of the Bede Metal and Chemical Co., and for Sir Samuel Roberts, director of Cammell, Laird & Co., Ltd., and a knighthood for Professor Boyd Dawkins, Hon. Professor of Geology and Palæontology in Victoria University, Manchester.

Messrs. Derby & Co., Ltd., dealers in chemicals, colours, rare earths, and bullion refiners, 44, Clerkenwell Road, London, E.C.1, have removed their offices to 37-38, Hatton Garden, E.C.1 (telephone, Holborn, 4980), to which address all communications should in future be forwarded. Their works will remain as at present at 44, Clerkenwell Road, E.C.1.

The Ministry of Labour announces that the Overseas Appointments Bureau of the Appointments Departments has been transferred to Horrex's Hotel, Strand, W.C. All letters and communications regarding appointments and training overseas, under the auspices of the Appointments Department, should now be addressed to the Director, Overseas Appointments Bureau, at the above address.

Dr. Charme, of Santiago, Chile, a farmer who is also a senator and was formerly a practising physician, announces the discovery of a process by which the time employed in the extraction of sodium nitrate can be reduced to two minutes without the employment of fuel. At present, it requires more than a month to precipitate the nitrate. Dr. Charme says he uses a substance composed of one organic and one inorganic material.

Professor Armand Gautier, in explaining recently to the Academy of Sciences in Paris, the results of his experiments on the effect of fluorine in the cultivation of the soil, stated that in a field in the soil of which fluorine had been mixed the wheat crop was 13 per cent. above the average; oats, 12 per cent.; carrots, 17 per cent.; and potatoes, 58 per cent. The use of fluorine in the cultivation of the vine also gave remarkable results.

The directors of the International Petroleum Co., Ltd., have elected Mr. Victor Ross a director and vice-president, succeeding the late Hon. W. J. Hanna. The directors of the Imperial Oil Co., Ltd., have also co-opted Mr. Ross to the Board. Mr. Ross was for many years the City editor of the *Toronto Globe*, but left a year ago to become assistant to the president of the Standard Oil Co. of New Jersey. Since then he has taken up his duties in New York.

Mr. Walter E. Rowley, manager of the chemical department of the National Aniline and Chemical Co. has returned to America from a trip to England, France and Italy. He estimates that it will be a year before European chemical industries will have recovered from the war, and several years before they will be on a pre-war basis. In Italy and France, the manufacturers are handicapped by labour troubles; England has less of this trouble, but is not as optimistic as France or Italy and recovery seems slower.

The President of the Board of Trade announces that he has appointed a departmental committee to investigate and report upon the present position and economic possibilities of non-ferrous mining in the United Kingdom, and to make recommendations as to such Government action as may be expedient in regard thereto. The members of the committee are Mr. H. B. Betterton, M.P. (chairman), Mr. H. F. Collins, Mr. J. Harris, Dr. F. H. Hatch, Sir Lionel Phillips, Bt., Mr. R. A. Thomas, and Mr. James Wignall, M.P. All communications should be addressed to the secretary, Mr. W. Palmer, Gwydyr House, Whitehall, S.W.1.

All the Beit Memorial Fellowships for Medical Research were resigned shortly after the outbreak of the war, the holders either accepting commissions in the R.A.M.C., or undertaking research work having an immediate relation to the war. Those who have made applications have now been re-appointed for the unexpired period of their fellowships. Various grants have been made during the war to officers of the R.A.M.C., to be applied to purposes of research. The unexpended income has been invested, and the trustees have thus been enabled to increase the value of all the fellowships from £250 to £300 per annum. The regulation requiring the fellows to devote the whole of their time to research has been so modified as to allow the holders of teaching posts to become fellows, provided that the director of the laboratory concerned is satisfied that their work permits of adequate time being devoted to research. The trustees have recently acquired a lease, with option of purchase, of a portion of the buildings at Cambridge, known as "The Balfour Laboratory," in order to ensure their continued use by the university for research in bio-chemistry under Professor F. Gowland Hopkins, F.R.S. Such of the Beit fellows as may be engaged in bio-chemical research will, with the approval of the director, work in the laboratory. The next election of fellows will take place in December, 1919. All correspondence of candidates and fellows should be addressed to the Hon. Secretary, Beit Memorial Fellowships for Medical Research, 35, Clarges Street, W. 1.

An explosion occurred on Tuesday at the dye works of Messrs. Naylor, Jennings & Co., in Green Lane, Yeadon, near Leeds (Yorks.). The explosion which took place amongst a number of steel drums, or kegs, containing various chemicals, which were standing in a shed with an open end and a glass roof, is thought to have been caused by the heat of the sun's rays striking through the glass directly on to the drums. Considerable damage was done to the part of the premises where the explosion, followed by a fire, occurred. About eleven of the firm's workpeople were gassed by chemical fumes, and as many more were cut by falling glass from the shattered roofs and windows. Alvin Smith, of Guiseley, was injured seriously enough to necessitate his removal to the Leeds Infirmary. The Leeds Fire Brigade, with the help of the workmen extinguished the fire in about half-an-hour. Where the drums of chemicals had exploded a hole had been blown in the stout stone wall of the bleaching house big enough for a horse and trap to drive through. The drums contained chlorate of soda, and after the explosion a quantity of chrome and salts of lemon became involved. The fumes also dyed the walls around a vivid yellow. An additional danger during the short time the fire lasted lay in a dozen carboys containing various acids. They were very close to the flames, but, fortunately, no further explosion occurred. No estimate has been made of the damage but the repairs to the various roofs and walls and windows will cost many hundreds of pounds. The damage is covered by insurance.

Chemical Matters in Parliament

Spirit Duty

Sir F. Hall (Aug. 6, House of Commons) asked the President of the Board of Trade whether he is aware that the present duty on spirit adds so heavily to the cost of certain manufactured articles, especially those in which it forms the basis of the manufacture, as to render it impossible for British manufacturers to compete with Germany, having regard to the relatively low cost of spirit in that country; and whether he will consider the advisability of modifying the duty in such cases and to that extent enable the British home trade to compete with German imports?

Mr. Baldwin: Methylated spirit, which is free of duty when made in this country, is allowed in the manufacture of a large number of articles in which the use of spirit is required by British manufacturers. In addition, pure spirit is, under certain conditions, allowed to be used by them free of duty in arts or manufactures under the provisions of Section 8 of the Finance Act, 1902 As at present advised, I do not think that any alteration of the law is called for, but if the hon. and gallant member has any particular manufacture in mind, and will put before me the case, I will consider it. Where imported articles contain spirit they are, of course, charged on importation with the full Spirit Duty.

Cordite Production at Gretna Green

In reply to Mr. Rose (August 7, House of Commons), Mr. Kellaway stated that the total capital expenditure on the building and equipment of the Gretna Green explosives factory was approximately, £9,184,000. The cost of working the factory from September, 1916, to the end of September, 1918, was about £12,769,000. The staple product of the factory was cordite, though considerable quantities of intermediate products were supplied to other factories. Taking cordite alone, the value of the total production of the factory was estimated at about £15,000,000, on the basis of the average cost of the cordite supplied from home contractor's works during the same period. Prior to Gretna coming into production, this country had been dependent on United States of America for a large part of its cordite. Had we bought from America the quantity of cordite produced at Gretna, the cost at the price paid to America in 1916, would have been £23,600,000. A report on the future use of the factory is at present under consideration.

Chemists' Salaries at Gretna

Mr. R. Young (August 7, House of Commons), asked the Parliamentary Secretary (1) whether he is aware that in November, 1918, a letter, signed by the chemists in His Majesty's factory, Gretna, and other explosive factories, was forwarded to the then Minister of Munitions, asking him to receive a deputation with regard to their claim for a revision of salary; whether he is also aware that the superintendent expressed himself as being in sympathy with the claim of the chemists, and that no reply has ever been sent to the letter; whether he will have this matter inquired into and full consideration given to the question of salaries; (2) whether he is aware that a memorial, signed by the chemists employed at Gretna and other explosive factories, was forwarded to the Department of Explosives Supply; whether any reply was given by the Department to this memorial; whether he is aware that the memorial asked that a minimum salary of £350 be paid to chemists on the grounds that, for purposes of efficient factory control and the maintenance of discipline, the principle must be admitted that any official should be paid more than individuals for whose work he is responsible and whom he controls, and that a considerable percentage of the operatives and tradesmen employed are paid more than the chemists, while a very large number receive about the same amount; whether any consideration has been given to this memorial; and whether it is proposed to grant the claim?

The Parliamentary Secretary to the Ministry of Munitions (Mr. J. Hope) in his reply stated:—

The question of the salaries paid in national factories to chemists and other technical officers had been under consideration before the memorial was addressed to the Minister of Munitions on November 16, 1918, by the chemists employed at Gretna and other explosive factories, and at about the same time a memorandum was received from the Institute of Chemistry of Great Britain and Ireland which covered the whole ground of the memorial. This letter was communicated to the Government Departments concerned, and finally led to the appointment of a Committee by the Treasury. This Committee is examining, in consultation with the Departments, the question of the salaries to be offered to scientific and technical officers whom it is desired to employ in the Government service. I sincerely regret that owing to pressure of work at the time of the Armistice a reply was not sent to the memorial.

I think it right, however, to add that the Explosives Supply Department of the Ministry of Munitions did much during the war to improve the status of chemists employed in industry, and even after making full allowance for the increased cost of living the scale of salaries paid by the Department can be compared favourably with the salaries paid by private firms under pre-war conditions. At the present the number of chemists employed in the Explosives Department is thirty-five, and owing to the cessation of production this number is being rapidly reduced.

Royalties on British Oilfields

In reply to Mr. Jameson (August 8, House of Commons), Mr. Chamberlain gave an assurance that up to that date nothing had been done to commit the country to the policy of establishing a new system of royalties upon oil, and that nothing would be done in that direction during the Recess.

Ownership of British Oilfields

Mr. Spoor (August 11, House of Commons) asked the Prime Minister whether the policy of the Government in regard to nationalisation or control of mines would also be applied to oilfields; and whether, in the interest of the country, he would consider the desirability of withholding licences to develop oil areas until the Government had decided upon its policy, so that, in the event of the Government proposing to nationalise oilfields, it might not be opposed by a vested interest?

Mr. Bonar Law, in reply, stated: As regards the first part of the question, the matter is now under consideration, and, pending a decision, it is the policy of the Government to withhold licences to develop oil areas. I may add that until the Government has come to a decision as to the ownership of petroleum in the British Isles, the purchasers of land and petroleum rights are warned not to assume that the ownership of petroleum is vested in the owner of the surface rights.

British Dyestuffs Corporation

Sir Philip Magnus asked the President of the Board of Trade whether the £850,000 of 7 per cent. preference shares and £850,000 of 8 per cent. preferred ordinary shares in the British Dyestuffs Corporation subscribed by His Majesty's Government represent new money, or whether they have been allocated in consideration of the £1,142,000 loaned by the Government at 4 per cent. to British Dyes, Ltd., one of the amalgamated companies?

Sir A. Geddes: His Majesty's Government were under obligation to advance to British Dyes, Ltd., on certain conditions a maximum sum of £1,700,000 secured by debenture bearing interest at 4 per cent. per annum. The amount advanced under that obligation has been repaid, and His Majesty's Government has subscribed instead for £850,000 7 per cent. preference shares and £850,000 preferred ordinary shares in British Dyestuffs Corporation, Ltd., which has been formed to amalgamate the undertakings of British Dyes, Ltd., and Levinstein Ltd.

Trade with Hungary

In view of the raising of the blockade, the Board of Trade have issued a general licence under the Trading with the Enemy Legislation authorising with certain reservations the resumption of trade with Hungary. The licence does not remove the existing restrictions upon the payment of debts, and the return of property due, or deliverable to persons in Hungary, in respect of pre-war transactions. Moreover, any permission which may be necessary in respect of any transactions under Defence of the Realm, Regulation 41 D, must be obtained from the Treasury. The licence does not permit the importation from Hungary of any goods included in the Prohibition of Import Proclamations, and not covered by a general licence issued under those proclamations. Further, export licences must be obtained from the Export Licence Department, 1, Queen Anne's Gate Buildings, Westminster, S.W.1., before goods included in lists "A" and "B" of prohibited exports are shipped to those countries. But no licences are now required in respect of goods included in list "C."

The Indian Market

Continued Increase of Trade with Japan and U.S.A.

(From Our Own Correspondent)

The review of the year 1917 recently announced from official quarters is of unusual interest, as it shows the effect of the war in increasing the trade of India with other parts. Over 11 per cent. of trade in the pre-war period was with enemy countries; and this has now been absorbed by other nations, particularly Japan and the United States. The pre-war imports showed:—United Kingdom, 63 per cent., 1917, 54 per cent.; British Possessions, 7 per cent., 1917, 10 per cent.; Japan, 2½ per cent., 1917, 12 per cent.; United States, 3 per cent., 1917, 8 per cent., &c. The most interesting fact is the large increase with Japan. The value of the imports from Japan was 400 per cent. above the pre-war average, while the exports of Indian merchandise increased by 103 per cent. The Indian trade with the United States was double that in the pre-war period, and second only to that of Japan; the imports increased by 163 per cent., and the exports of Indian merchandise to the United States by 81 per cent. The imports of machinery increased from Japan and the United States. Japan supplied 80 per cent. of the copper; her share in the pre-war period was 9 per cent. She also more than doubled her supplies of sulphur, the increase being from 4.100 tons to 9,500 tons.

The total value of imports of chemicals increased by 45 per cent. More than two-thirds of the chemicals came from Britain, one-fifth from Japan, and 11 per cent. from the United States. More than 81 per cent. of camphor came from Japan. Tools and metal wares, vacated by Germany and Austria, have been steadily captured by the United States, whose trade increased from 19 per cent. to 28 per cent., and Japan from 16 per cent. to 25 per cent.; in the pre-war year they supplied 6 per cent. and 1 per cent. respectively. Of metal lamps, the United States supplied 80 per cent. and Japan 16 per cent. Japan supplied 25 per cent. of the paper, a remarkable achievement; and also 91 per cent. of matches. Of instruments, apparatus, &c., the United States' share was 17 per cent., and Japan 36 per cent. Glass bottles, phials and funnels totalled £247,000, of which Japan supplied £168,000 and 71 per cent. of sheet glass. During the year, a noticeable increase was shown in the imports of British-made aniline dyes, totalling 1,979,000 lb., of which 72 per cent. came from the United Kingdom, 385,000 lb. from the United States, and 101,000 lb. from Japan. It may be interesting to note that for the first time Japan took the lead in beer, supplying 48 per cent. against Britain's 43 per cent. The Indian breweries' output was 6,217,000 gallons. Now that peace has been proclaimed and British factories are free, no time should be lost in regaining lost ground by British firms.

Trade Activity

During the first two months of the current official year—April-May, 1919—the imports of chemicals into India were valued at Rs. 6,128,307; dyes, Rs. 4,831,503; machinery, Rs. 14,522,221 (an increase of Rs. 6,033,924 over the corresponding period last year); iron and steel manufactures, Rs. 27,908,469 (an increase of Rs. 15,165,539); other metals, ditto, Rs. 5,908,467. During April, the exports of manganese were:—To United Kingdom, 30,927 tons, value Rs. 633,390; to Belgium, 2,500 tons, value Rs. 37,500; to France, 3,000 tons, value Rs. 52,500.

Projects for machinery and plant for the manufacture of arrow-root in Travancore (estimate, Rs. 20,000), and for an Indian Government project for Burma tannins, are under consideration. Various English firms have of late opened up branches in India under the Indian Liability Act. The proposed registration of business names has a two-fold object, (1) to identify alien interests; and (2) by compelling disclosure of assumed names to facilitate by rendering more precise commercial transactions. The United Provinces Government have awarded State Technical Scholarships for 1920 in (1) glass-making, (2) dyeing, &c. It was suggested that facilities did not exist in England for giving a really first-class training in glass-making, and arrangements might be made for the students to be trained in America or Japan.

Demand for Machinery and Chemicals

The demand for suitable machinery, labour-saving appliances and chemicals is enormous, and no time should be lost in announcing through trade journals and illustrated circulars what this country is prepared to supply. Among articles being pushed now are mineral acids, chemical manures, aluminous cake, water purifiers, magnesium sulphate, iron sulphate, alum, heavy chemicals, Epsom salts, Glauber salts, nitric acid, sulphuric acid (pure and commercial), hydrochloric acid, copperas, soda crystals, caustic soda, aniline salt and oil, &c.

Geological Survey

The Geological Survey of India has investigated the possibilities of manufacturing calcium carbide, calcium cyanamide, and sodium cyanide in India. A proposal is made for plant to produce 6,000 tons of carbide annually—1,000 tons for sale in India, 1,000 tons for sale in outside markets, and 4,000 tons to yield 5,000 tons nitrolin as manure in India, &c. A site has been selected in Burhar, in the Rewa State, and electric power is to be generated from Mond gas, with recovery of ammonia as sulphate. The figures show a profit of 48 per cent. on cost of chemical plant, or 24 per cent. on cost of chemical and power plant. The commercial man in India always welcomes assistance in formulating and working out schemes and projects.

Appointments

Captain R. B. Lloyd, Acting Imperial Seriologist, has been appointed chemical examiner to the Burma Government.

Mr. Nilratan Dhar has been appointed by the Secretary of State for India, to the Indian Educational Service, as Professor of Physical and Inorganic Chemistry, Muir Central College, Allahabad.

Obituary

Professor Ernst Haeckel.—The death occurred last week, in his 86th year, of Professor Ernst Heinrich Haeckel, who, in the opinion of many scientists, ranks with Darwin, Huxley, and Kelvin. Darwin's "Origin of Species" made its appearance about the time when Professor Haeckel began his scientific career. He fell under its influence, and became forthwith the leading exponent of the Darwinian theory in Germany. At the age of thirty-two Haeckel published his work on "General Morphology," which is acknowledged to be an event in the history of biological research. He republished it later in a popular style as "The Natural History of Creation." Haeckel carried on the theories of Darwin to more definite conclusions. He traced the evolution of man through twenty-six stages, and was the first who attempted to draw a genealogical tree showing the origins and relationships of the animal kingdom. His most ambitious work was "The Riddle of the Universe," published in 1900, in which he attempted to apply the doctrine of evolution to the problem of the higher nature of man. If Haeckel had died ten years ago (according to a writer in the *Times*), he would have secured a more honourable place in English memory. The progress of exact scientific work discovered many flaws in his work, which he neither recognised nor attempted to correct. His attitude in the war shocked most of his large circle of English admirers and friends. He was one of the signatories of the letter issued in October, 1914, in which 93 leaders of German science and German thought proclaimed the German case in its most aggressive form, denied the Belgian atrocities, and defended *Kultur* and militarism.

Professor Edwin Lapper.—The death is announced of Professor Edwin Lapper, one of the best-known physicians and chemists in Dublin. Born in London Prof. Lapper on completing his scientific education, acted as assistant to the Professor of Chemistry in the Royal Veterinary College, London. In 1870 he left London for Dublin to become principal assistant to Sir Charles Cameron. He left the School of the College of Surgeons in 1877 to become Lecturer in Chemistry in the Ledwich School of Medicine. On the amalgamation of this school with the Royal College of Surgeons, he became joint Professor of Chemistry and afterwards Professor of Physics to the College, and carried out the duties of teaching and examining until the year 1915, when he was forced to retire owing to ill-health. Professor Lapper wrote many papers of scientific interest; he was a lucid and painstaking teacher, and a just and sympathethic examiner. He was elected a Fellow of the Royal College of Physicians in 1890.

Mr. J. M. Nicholson.—The death has taken place suddenly, from pneumonia, in London, of Mr. John Midgley Nicholson, only son of the late Mr. Joseph Nicholson, of Wheatfield, Headingley, Leeds, and of the firm of Messrs. J. Nicholson & Sons, chemical manufacturers, Hunslet, Leeds. At one time Mr. Nicholson held a commission in the West Riding R.F.A. (T.) and during the war he joined the Sportsmen's Battalion, and served in the ranks.

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

AMMONIA. Industrial synthetic ammonia. *Engineering*, August 8, 185-186. Based on paper presented by G. Claude to the Académie des Sciences, Paris, on May 19. It is proposed to use synthetic ammonia in the ammonia-soda process, to precipitate sodium bicarbonate and ammonium chloride by Schreib's repeated precipitation method, and to use the ammonium chloride as a fertiliser.

COMMERCIAL. Reports of some French chemical companies and some information regarding the proposed amalgamation of the Comp. Nat. de Matières Colorantes et de Produits Chimiques and the Soc. des Produits Chimiques et Colorantes Français. *Chem. Trade J.*, August 9, 145-146.

ELECTROMETALLURGY. Electrometallurgy in Germany during the war. *Engineering*, August 8, 184-185. Based on article by V. Engelhardt in *Elektrotechn. Zeits.*, May 8.

POWER. Care of retort-house electrical plant. E. Davies. *Gas J.*, August 12, 338. Gives useful hints in regard to proper operation and care of electric motors.

Use of raw tars as fuels for Diesel engines. H. Moore. *Engineering*, August 8, 167-168. The tar should have sp. gr. below 1.2, and the upper limits should be 0.08 per cent. for ash, 2 per cent. for water, 6 per cent. for free carbon (insoluble in a mixture of toluol and glacial acetic acid), 10 per cent. for coke value. The gross calorific value should be at least 16,380 B.Th.U.

SULPHITE WASTE LYES. Uses of waste sulphite liquor. *Board of Trade J.*, August 7, 184-185. From pamphlet issued by Forestry Branch of Canadian Department of Interior.

American

ARSENIC. Direct production of "white arsenic." C. A. Doremus. *Trans. Amer. Electrochem. Soc.*, 1919, 279-281.

CRUCIBLES. Some properties of bond clays for graphite crucibles. M. C. Booze. *J. Amer. Ceram. Soc.*, June, 461-476.

DYES. American dyes in 1918. *Textile Colorist*, July, 226.

ELECTROCHEMISTRY. Reference list of firms engaged in electrochemical industry of United States and Canada. *Amer. Electrochem. Soc.* The list is in two parts, containing (*a*) list of firms with their products, &c., and (*b*) list of products with names and addresses of firms producing them.

Production of silicon-manganese in the electric furnace. B. G. Klugh. *Trans. Amer. Electrochem. Soc.*, 1919, 269-278.

GLASS. Procedures in manufacture of optical glass. W. S. Williams and C. C. Rand. *J. Amer. Ceram. Soc.*, June, 422-442.

IRON. World's iron and steel output, 1900-1918. *Eng. and Min. J.*, July 26, 154.

PLATINUM. The platinum situation. J. M. Hill. *Eng. and Min. J.*, July 26, 131-137. Discusses shortage of platinum owing to disturbance of normal production due to the war; uses of platinum, and possibilities for maintaining supplies.

POWER. Use of oil in Diesel engines. L. H. Morrison. *Eng. and Min. J.*, July 26, 138-141. Deals with properties of oil, its treatment, storage, &c.

RADIOACTIVITY. Radioactive bricks. H. J. Knollman. *J. Amer. Ceram. Soc.*, June, 451-460. Describes manufacture of radioactive bricks for use in making water radioactive.

French

NITROGEN COMPOUNDS. Synthesis of nitrogenous fertilisers. *Rev. Prod. Chim.*, July 31, 367-371. First part of serial article. Deals with sources of nitrogenous fertilisers, synthesis of nitric acid from nitrogen, and synthesis of ammonia by the Haber process.

RAW MATERIALS. Resources of French Colonies. *Rev. Prod. Chim.*, July 31, 363-368. First part of serial article. Deals with natural resources of Algeria.

German

GAS. Fossil fuels and their utilisation in 1914-18. *Z. angew. Chem.*, July 22, 225-229. Part of serial article. Deals with uses of different technical gases, calorimetry, photometry, gas analysis, &c.

GLYCERIN. Obtaining glycerin by fermentation. W. Counstein and K. Lüdecke. *Ber.*, July 12, 1385-1391. By addition of relatively large properties of sodium sulphite a technical yield of 20—25 per cent. of glycerin on the sugar (molasses) is attainable.

PLATINUM. Behaviour of platinum towards hydrogen. A. Gutbier and O. Maisch. *Ber.*, July, 1368-1374. Platinum black absorbs much more hydrogen than spongy platinum does, viz., up to 160 vols. at 0° C.

POWER. Reducing working costs by economy of coal and oil. O. Grümer. *Chem. Zeit.*, July 17. Deals with utilisation of exhaust steam and removal of oil therefrom.

WOOD. Chemical composition of some German woods. C. G. Schwalbe and E. Becker. *Z. angew. Chem.*, July 22, 229-231. Gives results of chemical examination of spruce fir, Scotch pine, beech, birch, and poplar woods.

Premier Oil and Pipe Line

Voluntary Liquidation Approved

AT an extraordinary general meeting of the Premier Oil and Pipe Line Co., Ltd., held on Monday, it was decided, for the purpose of reconstruction, to authorise the voluntary liquidation of the company, and Mr. H. J. de Courcy Moore was appointed liquidator.

The chairman, in moving the resolution to this effect, submitted the following five arguments in favour:—(1) The Germans, by means of actions which your directors are satisfied were collusive, fraudulent, and totally misconceived, are doing their utmost to deprive you permanently of your property, and we cannot beat them in peace as our soldiers and sailors have beaten them in war without the sinews of war—that is, money; (2) when we get our properties into our own physical control we must have money to work them, and to make good the ravages of war which—though far less than might have been expected—still will necessitate considerable expenditure; (3) your directors are absolutely convinced that there ought to be no hesitation about resolutely following up and enforcing the just claims of our shareholders to full compensation for the vast quantities of crude oil extracted by the Germans from our properties during the war; and for the large quantities of refined oil and other manufactured productions of our wells, stolen from us during the war; but the prompt following up of those claims in a country like Galicia—and perhaps in any other country—requires money, though only, we think, a comparatively small amount compared with the very large sums we ought ultimately to recover; (4) your company owes debts—not to a large extent in comparison with its magnitude, say about £50,000—and if these debts were not paid your company would collapse; (5) the only practicable way of raising the money required for these purposes is by reconstruction, and that reconstruction necessitates the resolutions which I am going to move, and which are set out in detail in the notice convening this meeting.

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. Lists of patent applications and of "convention" specifications open to inspection before acceptance are added; abstracts of the latter appear as soon as possible thereafter.

Abstracts of Complete Specifications

117,634. Artificial Fuel and Methods of Making Same. American Linseed Co., 233, Broadway, New York, Assignees of J. Schaub, 16, Avenue C, Newark, N.J., U.S.A. International Convention date (U.S.A.), July 17, 1917.

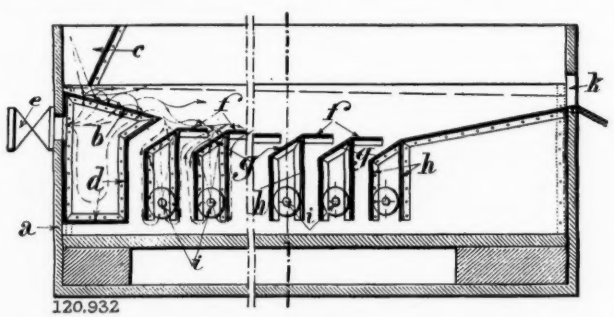
A cellulose nitrate, *e.g.*, the pentanitrate, which has a nitrogen content sufficient to render it soluble in methyl alcohol, is dissolved in methyl alcohol in the proportion of 4 parts to 46 parts. About 12 parts of ethyl alcohol containing 5-10 per cent. of water are then added to render the substance viscous. This substance is formed into a tubulous mass, the tubes of which are capillary in size, and these tubes are then filled with ethyl alcohol. The mass is then cut into cubes of the required size, which operation effects the sealing of the ends of the tubes.

117,817. Grates, Endless Chain. Compagnie Centrale d'Energie Electrique, 26, Rue aux Ours, Rouen, France. International Convention date (France), May 17, 1918.

The chain is formed by providing the grate bars with transverse pins, each pair of which engages with a pair of slots in each grate bar, one slot at each end of the bar, on the under side. The slots are formed as hooks in such a way that the bars cannot become detached when the chain is complete. The slots are constructed with lateral projections in such a way that they form spigots and sockets on adjacent bars, which are thus enabled to interlock.

120,932. Coke or Carbon from Slag or the Like, Apparatus for the Separation of. Soc. "Le Coke Industriel," 25, Rue Claude Delaroa, St. Etienne, France. International Convention date (France), November 23, 1917. (*See Illustration.*)

The mixture of coke and slag is fed from the hopper *c* to the inclined perforated plate *b*, which forms the cover of a compartment *d* which is supplied with water through the valve *e*. The water rising through the plate *b* washes the material on to a



series of non-perforated plates *f* at gradually descending levels. Other compartments are formed as shown by vertical non-perforated plates *h* and inclined perforated plates *g*, and water is admitted to these compartments by valves *i*. The solid material in passing over the plates *f* meets the rising currents of water from the plates *g*, and is separated, the heavier material falling to the bottom of the trough *a*, and passing over its inclined floor into an adjoining receptacle. The lighter material is carried over the plates *f* to the outlet *k*.

129,305. Nitric Acid and Ammonium Sulphate, Manufacture of. A. T. Cocking and Kynoch, Ltd., Lion Works, Witton, Birmingham. Application date, August 1, 1916.

Ammonium nitrate is treated with sulphuric acid in slight excess to avoid the production of nitrous oxide, under a vacuum corresponding to 25 in. of mercury. The temperature is at first kept below 100° C., but is finally raised, not above 195° C. The residue, consisting of ammonium sulphate and free sulphuric acid, solidifies at about 120° C. Alternatively the acid sulphate may be produced by using a large excess of sulphuric acid, and may then be neutralised with further ammonia. The nitric acid obtained by this process may be employed in the nitration of glycerine or cotton, and the ammonium sulphate may be sold direct or used for the production of superphosphates or other fertilisers.

129,306. Nitro-Phosphate Fertilisers, Manufacture of. A. T. Cocking and Kynoch, Ltd., Lion Works, Witton, Birmingham. Application date, August 1, 1916.

Ammonium nitrate is first produced from the atmosphere and the fixed nitrogen in solid fuel by the known process of gasifying the fuel in gas producers, and recovering the ammonia, using the gas to generate electricity for the production of nitric acid from the air, and combining the nitric acid with the ammonia. Sulphuric acid is obtained preferably from the waste acids from the nitration of cellulose or glycerine as described in Specification 129,305 (*preceding*), and the ammonium nitrate treated with it. The ammonium sulphate thus produced may be used direct, or may be used dissolved in water or an excess of sulphuric acid for the treatment of phosphatic material to produce a nitro-phosphate fertiliser.

129,349. Oils, Removal of Sulphur from. G. F. Forwood, Mark Lane Station Buildings, London, E.C. 3, and J. G. Taplay, 45, Sternhold Avenue, Streatham Hill, London, S.W.2. Application date, October 27, 1917.

Mineral, vegetable, or animal oils and extracts are washed with a solution of alkali sulphide or alkaline earth sulphide at a temperature of about 40° C., which extracts the sulphur. The oil is then washed with a dilute solution of caustic soda after separation from the sulphide solution. The process is mentioned as suitable for treating shale oil.

129,393. Coal Tar Pitch, Treatment of and Apparatus for Treating—for the Production of Fuel. S. Pearson and Son, Ltd., J. S. Smith and J. E. Hackford, 47, Parliament Street, Westminster. Application dates, April 13, 1918, and May 21, 1918.

Coal tar pitch, coal, or a coal product is heated to a temperature of about 750° C. for about eight hours, when most of the volatile constituents are expelled. The temperature is then raised to about 850° C. rapidly, and maintained at that point for two hours. Any volatile constituents remaining are thus expelled, and are removed by displacement with superheated steam. The process is carried out in a horizontal retort arranged in a combustion chamber so as to project at its ends through the walls of the chamber. The retort is suspended in the combustion chamber from a steel frame, and below the centre line of each retort a chequered brick wall is provided, separated from the retort by asbestos packing. The residue of coke in the retort is removed by a ram actuated by compressed air or other power, and the distillate is received in a condenser. The distillate may be dissolved in creosote or other solvent and used as a liquid fuel.

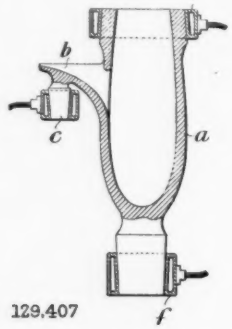
129,403. Melting-pots or Crucibles. E. C. R. Marks, London (From Driver-Harris Co., Harrison, N.J., U.S.A.). Application date, June 4, 1918.

A melting pot is constructed of an alloy of chromium 12 per cent., nickel 60 per cent., iron 26 per cent., and manganese 1.5 per cent. The nickel may be replaced by cobalt. The wall of the crucible is made sufficiently thin to prevent fusion, by the cooling effect of molten metal, *e.g.*, brass or copper, within the crucible. The alloy resists oxidation, but a slight non-flaking

film forms on its surface which protects it from the action of the contents.

129,407. Crucibles, Melting Pots and the Like, Electrically Heated. The Morgan Crucible Co., Ltd., and C. W. Speirs, Battersea Works, Battersea, London. Application date, June 8, 1918. (*See Illustration.*)

The crucible is composed of a material which is an electrical conductor and is heated by passing a current through it. The electrical terminals for the crucible *a* are shown at *e* and *f*, and are preferably water cooled. The invention consists in the pro-

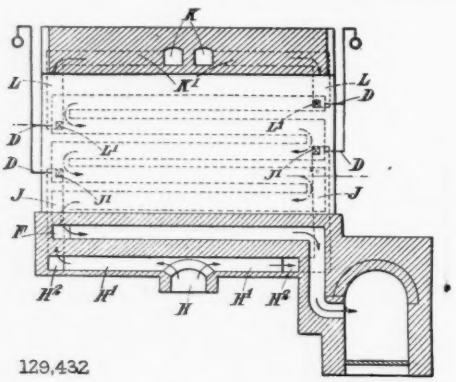


129,407

vision of another water cooled terminal *c*, through which the current may be passed into the spout *b* to heat the latter preparatory to pouring the metal from it.

129,432. Coke Ovens or the Like. J. Marr, 86, Mona Road, Sheffield; W. Colquhoun, Endcliffe Crescent, Sheffield, and The Coke Oven Construction Co., Ltd., 155, Norfolk Street, Sheffield. Application date, July 9, 1918. (*See Illustration.*)

The oven chambers, of which one is shown in vertical section, are separated by vertical walls having internal horizontal heating flues to which combustible gas is supplied under pressure through the pipes D. A longitudinal main horizontal air flue H is provided below the oven, and is connected by transverse branches H^1 and short longitudinal branches H^2 to vertical flues J in the dividing walls extending half way up only. The flues J are situated at the ends of the dividing walls between the ends of



129,432

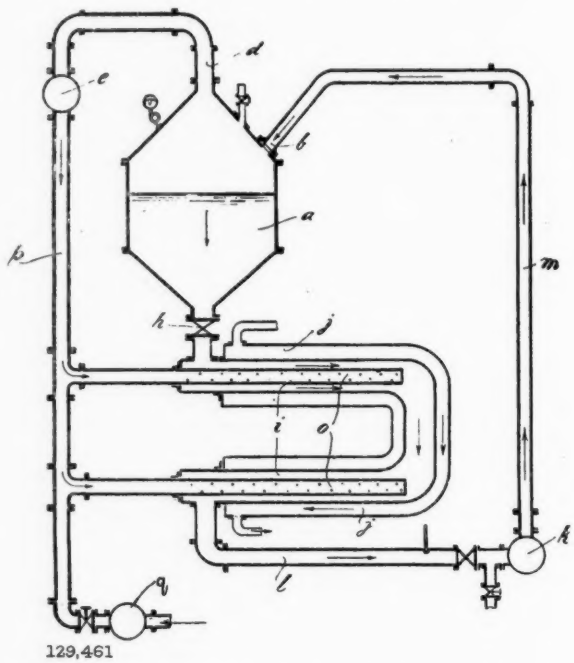
the horizontal heating flues. The ends of the heating flues and the sides of the flues J are tapered to allow the walls to be kept thin while accommodating the flues. The flues J communicate with the heating flues by ports J^1. The upper part of the oven is provided with similar air flues K connected to horizontal branches K^1 and vertical flues L extending half-way down only. Preheated air for combustion is thus supplied both from the top and bottom of the oven, so that the cross section of the vertical flues need only be half as large as if the air were supplied from the bottom only. The air is admitted to the heating flues by the ports J^1, L^1, and the course of the hot gases to the outlet flue F is shown by the arrows.

129,433. Coke Ovens and the Like. W. Colquhoun, Endcliffe Crescent, Sheffield; J. Marr, 86, Mona Road, Sheffield, and The Coke Oven Construction Co., Ltd., 155, Norfolk Street, Sheffield. Application date, July 9, 1918.

The specification relates to coke ovens of the same general type as that described in the preceding abstract. Two parallel series of horizontal heating flues only are provided in the dividing walls, and the two top flues only are connected to vertical flues in the dividing wall at one end, leading to a regenerator below. This division of the vertical flue into two parts, in line with the horizontal flues enables the thickness of the walls to be reduced. The lower end of the series of heating flues is connected to another regenerator. In a modification an additional vertical flue may be provided at the opposite end of the dividing wall, this flue and the corresponding ends of the horizontal flues being tapered as described in the preceding abstract.

129,461. Fats and Oils, Apparatus for the Hydrogenation of. Dr. G. Martin, 109, Corporation Street, Manchester. Application date, July 17, 1918. (*See Illustration.*)

Oil or the like mixed with catalyst is introduced through the pipe *b* into the vessel *a*, and passes out through a valve *h* to a series of conduits *i* surrounded by steam jackets *j*. The oil



129,461

is thus heated in the conduits *i* and not in the containing vessel. Hydrogen is circulated through the heated oil in counter-current by injecting it through the perforated pipes *o*, from which it passes to the conduits *i* and vessel *a*, and is finally returned to the pipes *o* by the pipe *d*, pump *e*, and pipe *p*. Fresh hydrogen is introduced by the pump *q*. The oil circulates back to the vessel *a* through pipe *l*, pump *k*, and pipe *m*.

129,495. Liquid Fuel. S. Pearson & Son, Ltd., J. S. Smith, and J. E. Hackford, 47, Parliament Street, Westminster.

Coal tar pitch distillate, obtained for example as described in Specification 129,393 (*described on previous page*), is mixed with an equal volume of creosote and double its volume of petroleum fuel oil. Petroleum fuel oil, having a relatively high sulphur content, may thus be utilised as a liquid fuel by reducing the relative amount of sulphur in the fuel so obtained.

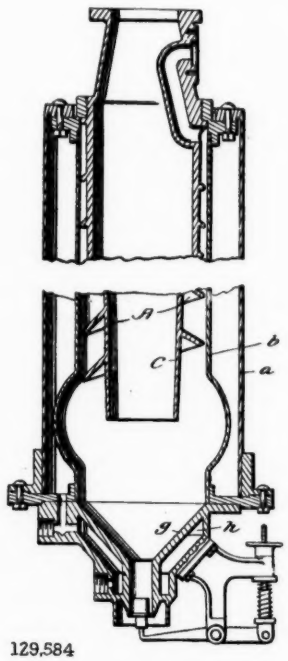
129,521. Cooling Liquids or Subjecting Them to the Influence of Air or Gas. A. Smallwood, 42, Hargrave Park, Highgate, London, N. Application date, September 20, 1918.

The apparatus comprises a device for spraying liquid. A helical spring, composed of metal of such section that it presents a narrow helical slot, is attached at one end to the liquid

supply conduit. An axial rod is attached to the outer end of the spring and passes up through it and through the wall of the supply conduit. The other end of the rod is attached to any suitable device by which it may be moved longitudinally. The effect of such movement is to vary the width of the helical slot by compressing the spring, and thereby to vary the nature of the spray from the slot.

129,584. Evaporating or Concentrating Liquids. E. Shaw, of British Acetones, Toronto, Ltd., Toronto, Canada. Application date, February 10, 1919. (*See illustration.*)

The apparatus is an improvement on that described in Specification 13,602 of 1914, and is suitable for viscous liquid. The liquid passes downward through the spiral passage between the outer and inner walls *b*, *c*. The passage is formed by a spiral



129,584

inclined flange A attached to the inner wall, but slightly spaced from the outer wall. The liquid continues to flow down the wall *b* into the cone *g*, and thence to the outlet. The device is contained in a casing *a* through which steam is circulated, and a steam jacket *h* is also provided for the cone *g*. The vapour from the concentrated liquid escapes upward through the conduit *c*.

129,605. Coke Oven Doors and the Like. W. H. Wright, 29, Stephenson Street, Dunston-on-Tyne, and E. Fenton, Claremont, Rowlands Gill, Durham. Application date, October 7, 1918.

The firebrick lining for a coke oven door is placed in the mould for the metal frame, and the metal is cast round it. The bricks are thereby pressed together and tightly held by the contraction of the metal.

Latest International Convention Specifications Open to Inspection

127,805. Mixing Solids and Liquids. P. A. Mallet, 10, Rue de Milan, Paris. International Convention date, June 3, 1918.

When a solid and a liquid, or two liquids are mixed and agitated by air or an inert gas under pressure, the gas is made to operate in a closed cycle to prevent loss of the liquid by evaporation. The process is applicable in the treatment of hydrocarbons with sulphuric acid or soda.

127,814. Fatty Acids, Polymerising. De Nordiske Fabriker, De-No-Fa, Aktieselskap, 41, Karl Johan's Gate, Christiania. International Convention date, June 4, 1918.

The soluble salt of a fatty acid, *e.g.*, the sodium salt of the fatty acid of soya oil is heated in an autoclave to 180°-214° C. The product may be decomposed to obtain the polymerised acid.

128,180. Tunnel Kilns. C. H. Zwermann, 1413, Grand Avenue, Kalamazoo, Mich., U.S.A. International Convention date, June 8, 1918.

The goods are passed in opposite directions through two tunnels arranged side by side. The dividing wall is provided near its ends with vertical flues communicating with the tunnels at top and bottom, so that air circulates through them and transfers heat from the cooling zone of one tunnel to the preheating zone of the other. Heating furnaces, to which preheated air is supplied, are arranged in the outer walls at the middle of the length of the kiln.

128,215. Cellulose Ester Solutions. H. Dreyfus, 8, Waterloo Place, London. International Convention date, March 4, 1914.

Cellulose acetates or other esters of cellulose may be dissolved in the following classes of solvents, used as camphor substitutes: (1) benzyl alcohol or its substitution products, (2) diphenylcarbinol or other aromatic alcohol, (3) acetophenone or methylacetophenone, (4) alkyloxy derivatives of acetophenone, benzophenone, &c., (5) certain halogenated derivatives of acetophenone or benzophenone, (6) cyclohexanone or its homologues or derivatives, (7) alcohols corresponding with the cyclic ketones under (6). These solvents may be used in the manufacture of varnishes, films, and celluloid.

Specifications Accepted, with Date of Application

129,667. Nickel from its Sulphide or Oxide, Recovery of. H. W. C. Annable, and Nickel Concentration, Ltd. November 19, 1917.

129,699. Nitrates, Production of. H. E. F. Goold-Adams, J. R. Partington, and E. K. Rideal. November 29, 1917.

129,709. Acid-Resisting Tanks, Conduits, and the Like, Construction of. Brookes' Chemicals, Ltd., and N. Brookes. December 3, 1917.

129,721. Smoke and Fume or Other Dust-laden Gas, Treatment of. W. E. Gibbs, R. J. Gilderson, and H. E. F. Goold-Adams. December 7, 1917.

129,758. High-Temperature Reactions, Methods of and Apparatus for Conducting. N. Testrup and Techno-Chemical Laboratories, Ltd. June 12, 1918.

129,760. Electric Furnaces. Morgan Crucible Co., and C. W. Speirs. June 14, 1918.

129,771. High-Temperature Reactions, Methods of and Means for Conducting. N. Testrup and Techno-Chemical Laboratories, Ltd. July 3, 1918.

129,765. Ammoniacal Liquors, Distillation or Treatment of. W. Wyld. December 18, 1918.

129,816. Furnaces. W. Topham. July 20, 1918.

129,829. Gas Washers. A. J. Liversedge and W. B. Davidson. July 29, 1918.

129,830. Furnaces and Other Heating Appliances, Construction of. G. H. Roberts and W. N. Booth. January 27, 1919.

129,850. Sulphate of Ammonia, Manufacture of. Oakbank Oil Co., and J. Wishart. August 26, 1918.

129,859. Filtration Apparatus. D. M. Stewart. September 4, 1918.

129,869. Furnace Ends of the Open Hearth Type. W. J Mellersh-Jackson (From Soc. Anon. C. M. Stein & Co.). September 19, 1918.

129,885. Gas Purifiers, Construction of Grids for. J. A. Spencer. October 18, 1918.

129,905. Filtering Process and Apparatus, Continuous-Pressure. J. A. McCaskell. November 21, 1918.

129,943. Burner Intended to be Placed under a Crucible or other Receptacle Containing Molten Material. M. Mathy. February 27, 1919.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. Only commodities whose values are at the time of particular interest or of a fluctuating nature are included in our weekly report. A more complete list and report, including a Continental and American report, appears in the first issue of each month, and will include prices of plant supplies, building materials, structural steel, fuels, glues, ores, refractories, metals, minerals, and miscellaneous materials, as soon as the necessary arrangements are completed. Our issue of August 2 contained some of these items. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report. Suggestions and criticisms in regard to these pages will be welcomed.*

Market Report

THURSDAY, August 14, 1919.

TRADE on the whole can only be described as quiet, although in some directions there has been fair activity.

The unsettled conditions in the North, and the incidence of the holiday season, have, of course, militated against business.

Prices are, however, firmly maintained, without any exceptional changes in values.

A moderate business has been done for export, and stocks do not appear to be so heavy as was the case a short time ago.

General Chemicals

ACETONE.—The position remains unaltered, with only a limited amount of business passing.

ACID ACETIC.—American makers are delivering very slowly, and freight is becoming increasingly difficult to obtain.

ACID BORACIC.—Supplies for early delivery are becoming very scarce, and command inflated prices.

ACID CARBOLIC.—The active demand continues for export, and makers seem determined to ask good prices for the remainder of their 1919 productions.

ACID FORMIC.—It is doubtful whether the home production will suffice for the textile trade's requirements when business becomes more active again.

ACID LACTIC.—A fair business has been done in this product at ruling prices.

ALUMINIUM SULPHATE.—This material is scarce and firmer. It would appear certain that the market must advance.

AMMONIUM SALTS are steady, with good inquiries for export.

ARSENIC.—Prices continue to advance steadily owing mainly to the good demand from abroad.

BLEACHING POWDER is idle, with very little business passing.

BORAX.—The English make has been fully sold. A number of orders have recently been placed with American sellers.

COPPER SULPHATE.—There seems to be slightly more inquiry, but we cannot trace that any large business has been done, and the market is still in buyer's favour.

FORMALDEHYDE.—The position remains firm and unchanged. Stocks in this country have been considerably reduced.

METHYL ALCOHOL.—No immediate change in the position is apparent, and we anticipate a steady market during the remainder of 1919.

POTASSIUM BICHROMATE.—The demand for export is very active.

POTASSIUM CARBONATE.—Now that the import restrictions have been withdrawn, the long-expected reduction in prices may be notified at any moment.

POTASSIUM PERMANGANATE.—A substantial reduction in price is shortly expected to take place, as Continental supplies will soon become available.

POTASSIUM PRUSSIATE.—A very fair business has been done both for home trade and for export.

SODIUM BICHROMATE.—Export orders have been unusually plentiful, and a sharp recovery in price has taken place in the U.S.A. The position here remains unchanged at present.

SODIUM CHLORATE.—Makers are eager to effect sales, and we anticipate a steadily falling market for some time.

SODIUM CAUSTIC is moving off better, and higher prices appear to be inevitable.

WHITE LEAD.—Large quantities are still wanted for this year's delivery, which makers are at present unable to supply.

Heavy Coal Tar Products

There is still considerable irregularity in the market, but on the whole the tone is firm, owing to the restriction of output due to the stoppage in Yorkshire.

BENZOL.—The demand for home consumption continues good, and prices for export have improved slightly to 1s. 9½d. or 1s. 10d. per gallon.

CREOSOTE.—There is rather more inquiry, but buyers hesitate to pay an advance in price, whilst manufacturers are unwilling to commit themselves in view of the prospect of reduced output.

CRESYLIC ACID.—There is some demand, and business has been done at 2s. to 2s. 3d. per gallon at works, according to quality and position.

NAPHTHALENE.—Quiet and unchanged in price.

PITCH.—The market remains firm, and business has been done at 80s. f.o.b. London, whilst there are sellers at 75s. f.o.b. East Coast and South Coast.

SOLVENT NAPHTHA.—This is in fair demand, and recent prices are 2s. per gallon in the North and 2s. 3d. per gallon in the South.

Sulphate of Ammonia

Prices are unchanged, but owing to the reduction of output the Government permits for export are more restricted.

Coal Tar Intermediates

ANILINE OIL AND SALT.—There is more demand for these products, particularly for shipment to the East. The market remains firm here, and prices recently have been advanced by American makers.

BETANAPHTHOL is exceedingly short for spot delivery, and manufacturers are well sold forward.

TECHNICAL RESORCIN.—Makers have been unfortunately unable to cope fully with the strong demand, and several buyers are disappointed in having been unable to obtain early supplies.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	9	to	0	3	0
Acetone, pure	ton	95	0	0	to	97	0	0
Acid, Acetic, glacial, 99-100%	ton	80	10	0	to	82	0	0
Acetic, 80% pure	ton	63	0	0	to	65	0	0
Carbolic, crystal, 39-40°	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	4	5	to	0	4	6
Lactic, 50% vol.	ton	66	0	0	to	68	0	0

August 14, 1919.

	per	£	s.	d.		£	s.	d.
Acid, Lactic, 60% vol.	ton	83	0	0	to	85	0	0
Oxalic	lb.	0	1	2½	to	0	1	3
Pyrogallic cryst.	lb.	0	11	6	to	0	11	9
Tannic, coml.	lb.	0	2	9	to	0	3	0
Tartaric	lb.	0	3	3	to	0	3	4
Alum, lump	ton	17	10	0	to	17	15	0
Aluminium sulphate, 14-15%	ton	13	10	0	to	14	0	0
Aluminium sulphate, 17-18%	ton	17	0	0	to	17	10	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	9
.880	ton	32	10	0	to	37	10	0
Carbonate	lb.	0	0	6½				
Muriate	ton	45	0	0	to	47	0	0
Nitrate	ton	55	0	0	to	57	10	0
Phosphate	ton	112	0	0	to	115	0	0
Arsenic, white 99-100%	ton	55	0	0	to	57	10	0
Barium, Carbonate, 92-94%	ton	12	0	0	to	13	0	0
Chloride	ton	25	10	0	to	26	0	0
Nitrate	ton	50	0	0	to	51	0	0
Sulphate (blanc fixe), dry	ton	25	10	0	to	26	0	0
Sulphate (blanc fixe), pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	13	0	0	to	13	10	0
Borax crystals	ton	48	0	0	to	50	0	0
Calcium acetate, grey	ton	20	10	0	to	22	0	0
Calcium chloride	ton	8	10	0	to	9	0	0
Casein, technical	ton	78	0	0	to	80	0	0
Cobalt oxide, black	lb.	0	7	9	to	0	8	0
Copper sulphate	ton	44	0	0	to	45	0	0
Cream Tartar, 98-100%	ton	230	0	0	to	235	0	0
Epsom Salts (see Magnesium Sulphate).								
Iron, perchloride	ton	32	0	0	to	34	0	0
Sulphate (copperas)	ton	4	15	0	to	4	17	6
Lead, Acetate, white	ton	82	10	0	to	85	0	0
Carbonate (White Lead)	ton	51	0	0	to	55	0	0
Nitrate	ton	58	0	0	to	59	0	0
Lithopone, 30%	ton	44	0	0	to	45	0	0
Magnesium, Chloride	ton	15	0	0	to	16	0	0
Carbonate, light	cwt.	3	0	0	to	3	5	0
Sulphate (Epsom salts, coml.)	ton	11	10	0	to	12	10	0
Sulphate (druggist's)	ton	17	0	0	to	18	0	0
Methyl Acetone	ton	89	0	0	to	90	0	0
Methyl Alcohol, 1% Acetone	gall.	0	9	0	to	0	9	6
Potassium, Bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	95	0	0	to	97	10	0
Chlorate	lb.	0	1	2	to	0	1	3
Metabisulphite, 50-52%	ton	210	0	0	to	220	0	0
Nitrate refined	ton	58	0	0	to	60	0	0
Permanganate	lb.	0	3	3	to	0	3	6
Prussiate, yellow	lb.	0	1	10	to	0	1	11
Prussiate, red	lb.	0	6	0	to	0	6	3
Sulphate	ton	37	10	0	to	40	0	0
Sal. Ammoniac, firsts	cwt.	4	0	0				
Sal. Ammoniac, seconds	cwt.	3	15	0				
Sodium, Acetate	ton	52	0	0	to	55	10	0
Arseniate, 45%	ton	47	10	0	to	48	10	0
Bicarbonate	ton	9	0	0	to	9	10	0
Bisulphite, 60-62%	ton	30	0	0	to	31	0	0
Chlorate	lb.	0	0	7	to	0	0	7½
Caustic, 70%	ton	20	0	0	to	20	10	0
Caustic, 76%	ton	23	10	0	to	24	0	0
Hyposulphite, coml.	ton	18	0	0	to	19	10	0
Nitrite, 96-98%	ton	58	10	0	to	60	0	0
Phosphate cryst.	ton	25	0	0	to	25	10	0
Prussiate	lb.	0	0	7½	to	0	0	8
Sulphide, cryst.	ton	15	10	0	to	16	0	0
Sulphide, solid, 60-62%	ton	22	0	0	to	23	10	0
Sulphite, cryst.	ton	11	0	0	to	11	10	0
Strontium, Carbonate	ton	85	0	0	to	90	0	0
„ Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur, chloride	ton	38	0	0	to	40	0	0
Tetrachlorethane (Westron)	ton	60	0	0	to	65	0	0
Tin perchloride, 33%	lb.	0	2	4	to	0	2	5
„ Protochloride (tin crystals)	lb.	0	1	9	to	0	1	10
Trichlorethylene (Westrosol)	ton	75	0	0	to	80	0	0
Zinc, chloride, 102 Tw.	ton	22	0	0	to	23	0	0
Chloride, solid, 96-98%	ton	60	0	0	to	62	10	0
Sulphate	ton	21	10	0	to	23	0	0
Oxide, Redseal	ton	75	0	0	to	80	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	6	to	0	2	9
Aniline oil, drums free	lb.	0	1	3	to	0	1	4
Aniline salts	lb.	0	1	3½	to	0	1	4
Anthracene, 85-90%	lb.	0	1	5	to	0	1	6
Benzaldehyde (free of chlorine)	lb.	0	3	6	to	0	3	9
Benzidine, base	lb.	0	5	6	to	0	6	0
Benzidine, sulphate	lb.	0	4	9	to	0	5	0
Benzoic, acid	lb.	0	5	0	to	0	5	3
Benzoate of soda	lb.	0	5	0	to	0	5	3
Benzyl chloride, technical	lb.	0	1	9	to	0	2	0
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	2	3	to	0	2	6
Betanaphthylamine, technical	lb.	0	6	6	to	0	7	0
Dichlorbenzol	lb.	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	8	0
Dinitrobenzol	lb.	0	1	4	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	2	to	0	1	3
Dinitronaphthaline	lb.	0	2	0	to	0	2	3
Dinitrotoluol	lb.	0	1	10	to	0	2	0
Dinitrophenol	lb.	0	1	10	to	0	2	0
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	7	6	to	0	8	0
Metaphenylenediamine	lb.	0	4	6	to	0	4	9
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Naphthionic acid, crude	lb.	0	3	6	to	0	3	9
Naphthylamin-di-sulphonic acid	lb.	0	4	6	to	0	5	0
Nitronaphthaline	lb.	0	1	2	to	0	1	6
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	0	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor.	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	4	0	to	0	4	6
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	14	0	to	0	15	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic, anhydride	lb.	0	14	0	to	0	15	0
Resorcin, technical	lb.	0	11	0	to	0	12	0
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salicylic acid	lb.	0	2	4	to	0	2	6
Salol	lb.	0	4	6	to	0	5	0
Sulphanilic acid, crude	lb.	0	1	2	to	0	1	3
Tolidine, base	lb.	0	9	0	to	0	10	0
Toluidine, mixture	lb.	0	2	9	to	0	3	0

Chemical Trade Enquiries

(*From the "Board of Trade Journal" of August* 14.)

CHEMICALS, &c.—An important French company, who deal in foodstuffs, agricultural and Colonial produce and chemicals, and have large warehouse accommodation and wharfage and offices in Paris, the provinces and abroad, offer to place their services, premises, and commercial offices at the disposal of United Kingdom producers, manufacturers, importers and exporters, with a view to establishing and developing an extensive business.

CHEMICAL PRODUCTS.—An agent in Alexandria desires to represent British manufacturers of chemical products, oil paints, perfumes, &c.

Electrified Wheat

An interesting experiment as to the effect of electrically treating seed wheat before sowing, has been carried out at Bodsham Green, Elmstead, Kent, during this season by Mr. W. E. Pledge, of the Victoria Flour Mills, Ashford. The variety of wheat chosen for the experiment was "Red Standard," and two adjoining plots were sown on November 13 and 14 last, at the rate of three bushels to the acre, the seed on one plot being electrically treated, and that on the other not. The land was treated exactly alike through the year. On Saturday, the growing crops were inspected by a party, including Mr. Charles E. De Wolf, of 101, Leadenhall-street, London (joint patentee with Mr. H. E. Fry, Godmanstone, Dorchester). A marked difference between the two plots was noticeable, the wheat on the treated portion being much the more vigorous in growth and habit, and promising so far as the experts present were able to judge, a yield at least 20 per cent. higher than that of the untreated plot. There were evident signs of rust, too, in the untreated crop, and it was a significant fact that the other plot was, at any rate at the present stage, entirely free from this disease. It was the general opinion of those present that electricity is likely to become a very important factor in the cultivation of agricultural crops, and that great developments along that line may be confidently anticipated in the near future.

Company News

BARA (JAVA) ESTATES.—At the annual meeting last week, the chairman remarked that with regard to the future of rubber he was very optimistic. It seemed certain that as trade conditions improved there must be a tremendous increase in motor traffic all over the world, while it would be a long time before the wants of Central Europe and Russia could be satisfied.

W. & H. M. GOULDING.—For the year to June 30 the net profit of W. & H. M. Goulding, manufacturers of chemical manures and other chemicals, of Dublin, rose from £71,178 to £76,915. A sum of £7,000 is again to be set aside to cover estimated discounts on realisation of outstanding debts; £25,000 to the reserve, £500 bonus to directors, and £5,000 to depreciation are the same as twelve months ago, while this time £5,100 is to be placed to the staff provident fund. The dividend and bonus are to be maintained at 10 per cent. and £4,517 against £4,077, will be carried forward. In view of extensions and further developments of the business it is proposed to increase the capital by the creation of an additional 30,000 ordinary shares of £5 each.

ARIZONA COPPER.—Dividend for the past half-year of 9d. per share tax free, against 1s. 6d. in the preceding half-year. The directors explain that when hostilities ceased large stocks of copper, produced at high cost, were on hand, and difficult conditions will have to be faced for some time to come.

KUALA SELANGOR RUBBER.—The Company is offering 155,000 shares of 2s. each to shareholders, in the proportion of one new share for every two shares held. The issue is made at par; 310,000 additional shares are to be allotted as fully paid to shareholders by the capitalization of reserves.

MUNTZ'S METAL.—Interim dividend for the half-year ended June 30 at the rate of 5 per cent. per annum on both preference and ordinary shares, less tax.

INTERNATIONAL PAINT AND COMPOSITIONS (formerly Holzapfels).—Dividends for the half-year ended June 30 of 3 per cent. on the ordinary shares, less tax, payable on August 30.

VALLAMBROSA RUBBER.—The report of the company for the year ended March 31 last states, that the amount of rubber harvested during the year was 862,383 lb. The gross average price realised for the total crop was 1s. 10.3d. per lb., as against 2s. .05d. per lb. last year. The f. o. b. cost per lb. was 8.34d. as compared with 9.38d. for 1917-18. The "all in" cost—which was reduced by saving in freight and insurance on the portion of the crop sold locally—was 10.72d. as compared with 11.40d. last year. The estimated crop for the year now current is 1,112,000 lb. The profit, after charging to revenue the whole of the capital expenditure for the year (amounting to £7,304) was £15,874, to which is added the balance brought forward, £29,128; an interim dividend of 25 per cent. (6d. per share), less tax, was paid in December, 1918, and it is proposed to pay a final dividend of 37½ per cent. (9d. per share), less tax, leaving to be carried forward subject to directors' and auditors' fees, £22,865.

BAKU RUSSIAN PETROLEUM.—At an extraordinary general meeting of the Baku Russian Petroleum Co. (1909), Ltd., the resolution passed on July 24 approving the amalgamation agreement was unanimously confirmed. A further resolution was passed authorising the voluntary winding up of the company, and appointing Mr. J. W. Creasser as liquidator.

FORSTER'S GLASS COMPANY.—The prospectus has now been issued of Forster's Glass Co. (Ltd.). The capital is £350,000, equally divided into 7½ per cent. Cumulative Participating Preference shares of £1 each and Ordinary shares of £1 each. Offers are invited for the 175,000 Preference shares by the British, Foreign and Colonial Corporation through the London Joint City & Midland Bank, at the price of 20s. 6d. per share. The purchase consideration is £196,893, payable as to £175,000 in Ordinary shares and as to £21,893 in cash. The profit for the year to March 31 last was £28,002.

EUROPEAN OILFIELDS CORPORATION.—At a special meeting of shareholders in London on Monday, the resolution for amalgamation with other Russian Companies was confirmed. It was resolved to wind up the Company voluntarily, and to appoint Mr. H. W. West, liquidator.

SOUTHEND GAS.—The report of June 30th last states that the sale of gas showed an increase of 28.11 per cent. over the corresponding period of last year. Owing to the increase in the price of coal recently ordered by the Coal Controller and a further increased cost of labour, careful consideration has been given to the selling price of gas, and the directors have determined that there shall not be an immediate increase, but they may be compelled to make a further increase from Michaelmas next. The decrease in the dividends paid by the company owing to the operation of the sliding scale, is felt to be unfair, and an application may be made to Parliament in the next session to increase the standard price, as the Statutory Undertakings Temporary Increase of Charge Act, 1918, does not deal fairly with the interests affected. The sliding scale cannot in fairness, be applied to present-day trading. The balance available for dividend is £7,697, and dividends are recommended at the rate of 4½ per cent. per annum on the original and new ordinary stocks and 4½ per cent. per annum on new ordinary "B" stock, less tax at 6s in the £, carrying forward £2,960. Meeting, 20 and 22, York Road, Southend-on-Sea, August 19th, at 2.30.

Stocks and Shares

Commercial, Industrial, &c.

	Quotations Aug. 6.	Aug. 13.
Alby United Carbide Factories, Lim., Ord.	29/32–1 1/32	7/8–1
Associated Portland Cement Manufrs. (1900.) Lim., Ord.	7½–7⅝	8¼–8½
Bell's United Asbestos Co., Lim., Ord.	2–2⅛	2–2⅛
Bleachers' Association, Lim., Ord.	1 11/32–1 13/32	1 5/16–1 3/8
Borax Consolidated, Lim., Prefd. Ord.	4¼–4⅜	4¼–4⅜
Bradford Dyers' Assoc. Lim., Ord.	2 3/16–2 5/16	2 3/16–2 5/16
British Aluminium Co., Lim., Ord.	1 9/16–1 11/16	1 9/16–1 11/16
British Oil and Cake Mills, Lim., Ord.	2 7/32–2 9/32	2 11/32–2 13/32
British Portland Cement Manufrs., Lim., Ord.	31/0–33/0	32/6–34/6
Brunner, Mond & Co., Lim., Ord.	2 1/32–2 3/16	2 1/32–2 3/32
Castner-Kellner Alkali Co., Lim.	2⅛–2¼	2⅛–2⅛
China Clay Corporation, Lim., Ord.	⅛–⅜	⅛–⅜
Cook (Edward) & Co., Lim., 4% 1st Mort. Deb. Stock Red.	57–61	57–61
Courtaulds, Lim.	9¾–10¼ xd	9¾–10¼ xd
Crosfield (Joseph) & Sons, Lim., Cum. 6% Prefce.	⅞–1⅛	⅞–1⅛
Curtis's & Harvey, Lim.	2 9/16–2 11/16 xd	2 9/16–2 11/16
Explosives Trades, Lim., Ord.	19/6–20/6	19/6–20/6
Field (J. C. & J.), Lim., Ord.	7/16–9/16	7/16–9/16
Greenwich Inlaid Linoleum (Fredk Walton's New Patents) Co., Lim., Ord.	⅛–⅜	⅛–⅜
Harrisons & Crosfield, Lim., 10% Cum. Prefd. Ord.	1 11/32–1 13/32	1 11/32–1 13/32
India Rubber, Gutta Percha and Tel. Wks. Co., Lim., Ord.	17½–17⅝	16¾–17¼
Lawes' Chemical Manure Co., Lim., Ord.	6–6½	6–6½
Lever Bros., Lim., 6% Cum. "A" Pref.	19/4½ 19/10½	19/9–20/3
Do. 6½% Cum. "B" Pref.	19/10½ 20/4½	19/10½ 20/4½
Magadi Soda Co., Lim., Ord.	1 1/16–1 3/16	1 1/16–1 3/16
Manganese Bronze and Brass Co., Lim., Ord.	11/16–11/16	11/16–11/16
Maypole Dairy Co., Lim., Defd. Ord.	1 7/32–1 9/32	23/32–25/32
Mond Nickel Co., Lim., 7% Cum. Pref.	1–1⅛ xd	1–1⅛ xd
Do. 7% Non. Cum. Pref.	11/16–1 1/16 xd	11/16–1 1/16 xd
Pacific Phosphate Co., Lim., Ord.	5¼–5½ xd	5¼–5½ xd
Power-Gas Corporation, Lim., Ord.	⅞–1	⅞–1
Price's Patent Candle Co., Lim.	38–40	41–43
Salt Union, Lim., Ord.	1 9/32–1 13/32	1 9/32–1 11/32
United Alkali Co., Lim., Ord.	1⅛–1⅛	1⅛–1⅛
Val de Travers Asphalte Paving Co., Lim.	11/16–1 1/16	11/16–1 1/16
Van den Berghs, Lim., Ord.	3 5/16–3 7/16	3 5/16–3 7/16
Walkers, Parker & Co., Lim.	1 31/32–1 33/32	1 31/32–1 33/32
Welsbach Light Co., Lim.	2 1/16–2 3/16	2 1/16–2 3/16

Gas, Iron, Coal and Steel

Armstrong (Sir W. G.) Whitworth, Ltd., Ord.	34/0–35/0	34/0–35/0
Ebbw Vale Steel, Iron & Coal Co., Lim., Ord.	1 7/32–1 9/32 xd	1 7/32–1 9/32 xd
Gas Light and Coke Co., Ordinary Stock (4% Stand.)	51–54xd	50–53xd
Hadfield's, Limited, Ordinary	1 31/32–1 33/32 xd	1 31/32–1 33/32 xd
South Metropolitan Gas Co., Ordinary (4% Stand.)	52–55	52–55
Staveley Coal & Iron Co., Lim., Ord.	1 13/16–1 15/16	1 13/16–1 15/16
Vickers, Limited, Ordinary	34/6–35/6	34/6–35/6

Mines, Nitrate, &c.

Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.	13½–14½	13½–14½
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) 5½% 1st. Mt. Debs. Red.	88–93	88–93
Lagunas Nitrate Co., Lim.	1⅛–1⅜	1⅛–1⅜
Rio Tinto Co., Lim., Ord. (Bearer)	59½–6	57–59
Tarapacá and Tocopilla Nitrate Co., Lim.	14/6–15/6	14/6–15/6

Oil and Rubber

Anglo-Java Rubber & Produce Co., Lim.	5/9–6/3	6/4½–6/10½
Anglo-Maikop Corporation, Ltd., Ord.	5/6–6/6	5/6–6/6
Anglo-Malay Rubber Co., Lim.	13/0–13/6	13/0–13/6
Anglo-Persian Oil Co., Lim., Cum. 6% Part.	1 29/32–1 31/32	1 29/32–1 31/32
Burmah Oil Co. Ltd., Ord.	14⅜–14⅞	13⅜–13⅞
Chersonese (F.M.S.) Estates, Lim.	3/9–4/0	3/10½–4/1½
Linggi Plantations, Lim., Ord.	.. ..	.. ..
Mexican Eagle Oil Co., Lim. (Cia Mexicana de Pet. "El Aguila" S.A.) Ordinary	8⅛–8¼	9–8 25/32
"Shell" Transport and Trading Co., Lim., Ord.	9 5/16–9 7/16	8⅛–8⅞
Do. 5% Cum. Pref.	9⅛–9⅜	9⅛–9⅜

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

LONDON GAZETTE

Partnerships Dissolved

THE SINGLE ROSE CHINA CLAY CO.—The partnership subsisting between William James Adams and John Stephens (as trustees of Richard Frederick Stephens, deceased), William John Kelly, William Martin, Thomas Martin, Hart Nicholls, Senior, Hart Nicholls, Junior (as trustees of Tom Nicholls, deceased) and Arthur Maunder Richards (as nominee and agent of Richard Richards & Sons), carrying on business as china clay merchants, at St. Austell, under the style of the Single Rose China Clay Co., has been dissolved by mutual consent as and from July 1. All debts received and paid by Henry Newcome Wright, St. Austell, solicitor, the Liquidator.

FANSHAWE, Frederick William, and FANSHAWE, Herbert Gordon, dyers and finishers, Western Road and Saffron Lane, Leicester, under the style of Shuttlewood & Fanshawe, by mutual consent as and from June 30, 1919. All debts received and paid by Frederick William Fanshawe.

Liquidators' Notices

STANDARD TAR CO., LTD.—A general meeting of members will be held at the offices of James H. Morton, Chartered Accountant, Capel House, 62, New Broad Street, London, E.C. 2, on Wednesday, September 10, at 11.15 a.m. James H. Morton, Liquidator.

COALITE, LTD.—A meeting of creditors will be held at 62, London Wall, E.C. 2 (Room 199, First Floor), on Wednesday, August 20, at 12 noon. Henry Bacon and James H. Macaulay, Liquidators.

BRITISH COALITE CO., LTD.—A meeting of creditors will be held at 62, London Wall, E.C. 2 (Room 199, First Floor), on Wednesday, August 20, at 2.15 p.m. Henry Bacon and James H. Macaulay, Liquidators.

Company Winding Up Voluntarily

THE SPANISH COPPER CO., LTD.—Herbert Ramon Yglesias, 6, Old Jewry, E.C., appointed liquidator. Meeting of creditors at the offices of Messrs. Lewis & Yglesias, Solicitors, 6, Old Jewry, London, on Thursday, August 21, at 11 a.m.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, created after July 1st, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

ELSTREE CHEMICAL WORKS, LTD., LONDON, E.C.—Registered July 29, £2,000 debs. part of £15,000; general charge.

Satisfaction

ELTON COP DYEING CO., LTD., ELTON, BURY.—Satisfaction reg. July 29, £20,000, reg. December 27, 1917.

County Court Judgment

[*NOTE.—The publication of extracts from the "Registry of County Court judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been setted between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

WATSON, Hugh, 11, Clarendon Place, Leeds, chemical manufacturer £25 18s. 7d., July 4.

In giving judgment in the King's Bench in an action arising out of the explosion at the Rainham Chemical Works in September, 1916, which resulted in great loss of life, Lord Justice Scrutton said there was no evidence as to he cause of the fire and explosion, although a very probable guess was that it was due to a workman smoking. Smoking by workmen in the most reckless way and in the most dangerous circumstances was notoriously common.

New Companies Registered

BALTIC WHARF CHEMICALS, LTD., 36, Mark Lane, E.C.—Nominal capital £15,000 in 15,000 shares of £1 each. Directors to be appointed by subscribers. Remuneration of Directors £50 each.

BRITISH FILM AND GENERAL TRADING CO., LTD., Trevelyan Buildings, 52, Corporation Street, Manchester.—Manufacturers and dealers in cinematograph films. Nominal Capital: £5,000 in 5,000 shares of £1 each. Directors: W. Hawkard, 110, Spotland Road, Rochdale; E. L. W. Horder, 12, Ducie Street, Oxford Road, Manchester. Qualification of Directors, £100; remuneration of Directors, to be voted by company in general meeting.

COMMERCIAL GLASS WORKS, LTD.—Nominal Capital, £150,000 in 1,500,000 Shares of 2s. each. Minimum Subscription, 7 Shares. Directors to be appointed by subscribers. Qualification of Directors, £100. Remuneration of Directors, £200 each; Chairman £250. Subscribers: J. K. Garioch, 16, King Street, Cheapside, E.C.; O. E. Tee, Daen House, Arundel Street, Strand, W.C.; and 5 others.

DUNRAVEN CEMENT AND LIME CO., LTD., 57, James Street, Cardiff, Glam.—Nominal Capital, £25,000 in 25,000 shares of £1 each. Directors: R. Jones, 119, Richmond Road, Cardiff; M. Wideman, "Trewinard," 48, Victoria Road, Penarth; J. C. Morgan, "Lindonthorpe," Leite Road East, Cardiff; E. Le Ray, 170, Newport Road, Routh, Cardiff; J. L. Morgan, Podawen, Caerphilly. Qualification of Directors, £300.

ELLENROAD RING MILL, LTD., Bentgate Street, Newhey, near Rochdale.—Dyers, finishers, bleachers, &c. Nominal Capital, £250,000 in 50,000 Shares of £5 each. Minimum Subscription, 5 per cent. Directors: F. Platt, 30, Ashfield Lane, Milnrow, near Rochdale; J. W. Platt, Rocklyn, Mellor Road, Ashton-under-Lyne; J. Smith, The Willows, Milnrow; G. H. Barnes, the Hollies, Milnrow; W. Heap, Heybrook, Rochdale; R. Milne, the Hollies, Manchester Road, Rochdale; A. Fielding, Corsey Dene, Newhey, near Rochdale. Qualification of Directors, 500 Shares. Remuneration of Directors, £100 each.

FEDERATED BOOT TRADERS SUPPLY CO., LTD.—Manufacturers and dealers in leather, hides, skins, &c. Nominal capital £50,000 in 50,000 shares of £1 each. Minimum subscription £1,500. Directors: J. Parsons, 246, Jesmond Road, Newcastle-on-Tyne; J. Mundy, 260, Lichfield Road, Birmingham; W. L. Raucutt, 13, High Street, East Ham, E., and six others. Qualification of Directors £50. Remuneration of Directors £100 each.

HEMINGWAY'S CHEMICAL PROCESSES CO., LTD., Aug. 1919, 15, Seething Lane, E.C.3.—Colour, paint and varnish manufacturers. Nominal capital £30,000 in 25,000 6 per cent. non-cumulative preference shares of £1 each and 5,000 ordinary shares all of £1 each. Directors to be appointed by subscribers. Qualification of Directors £500.

LONDON POLISH CO., LTD., 104, Great Russell St., W.C. 1.—Manufacturers, tanners and dealers in leather dressings and polishes, &c. Nominal Capital, £5,000 in 4,800 Ordinary Shares of £1 each, and 200 Management Shares of £1 each. Directors: Jessie Kuenstler, 14, Parsifal Road, West Hampstead (Chairman); H. L. Wallach, 7, Chatsworth Road, Brondesbury, N.W. 2; M. Palewski, 60, Well Street, South Hackney, E. Qualification of Directors, 50 Management Shares. Remuneration of Directors to be voted by company in general meeting.

MACSONS, LTD., 11, Quay Road, Blyth.—Wholesale manufacturing chemists and druggists. Nominal capital £2,000 in 2,000 shares of £1 each. Directors: G. Cormack, 34, High Street, Blyth.; A. Wilson, 11, Barnard Street, Blyth. Qualification of Directors £100. Remuneration of Directors £100 each.

MASTERSON ROUMANIAN OIL SYNDICATE, LTD., 29, Great St. Helens, E.C.3.—Nominal capital £20,000 in 20,000 shares of £1 each. Directors to be appointed by subscribers. Remuneration of Directors to be voted by company in general meeting.

NEVILLE BRUCE, LTD.—Dealers in cinematograph films. Nominal Capital, £10,000 in 10,000 shares of £1 each. Directors: R. W. Nevin, F. B. Hindmarsh, R. W. Simpson, 11, Prudhoe Street, Newcastle-on-Tyne, and nine others. Qualification of Directors, £200. Remuneration of Directors to be voted by company in general meeting.

CHAS. ORME & CO., LTD.—Drysalters, manufacturers and merchants and dealers in polishes, paints, &c. Nominal capital, £16,000 in 1,600 shares of £10 each. Directors: C. Harrison, 2 Springfield Gardens, East Dulwich, S.E.22; C. Harrison (Junior), 2, Springfield Gardens, East Dulwich, S.E.22; H. B. Harrison, 2 Springfield Gardens, East Dulwich, S.E. 22. Qualification of directors, 100 ordinary shares; remuneration of directors, to be voted by company in general meeting.

PHILIPPE LILONDU & CO., LTD., 3 and 4, Chichester Chambers, Chichester Rents, Chancery Lane, W.C. 2.—Manufacturers and dealers in drugs, chemicals, &c. Nominal capital, £800 in 800 shares of £1 each. Directors: P. Letondu, 68, Warren Street, W.1; J. Smolinsky, 68, Warren Street, W. 1. Qualification of directors, £100; remuneration of directors, £100 each.

PREMIER FILM AND CHEMICAL PRINTING CO., LTD., Upper Grove Street, Leamington.—Nominal capital £20,000 in 10,000 preference shares and 10,000 ordinary shares of £1 each. Directors: F. J. Whitlock (Chairman), H. Eaden, B. Morris, H. A. Browne. Qualification of Directors £100. Remuneration of Directors to be voted by Directors.

JOHN PECK & CO., LTD., Soho Street, Newtown, Wigan.—Chemical manufacturers. Nominal capital £30,000 in 30,000 shares of £1 each. Directors: J. Peck, Friarscroft, Fulwood, Preston; H. Peck, 4, Tower Mansions, Lord St., Southport. Qualifications of Directors 500 shares. Remuneration of Directors to be voted by company in general meeting.

ROBERTS CROUPLINE, LTD, 35, Deane Road, Bolton, Lancaster.—Proprietory medicine manufacturers and wholesale and retail druggists. Nominal capital, £15,000 in 15,000 shares of £1 each. Directors: T. Roberts (chairman), Sarah Roberts, Margaret J. Jones, H. S. Phillips, R. G. Hodkinson. Qualification of directors: £500; remuneration of directors, to be voted by shareholders.

ROUMANIAN DRILLING & TRADING CO., LTD., 45, Russell Square, W.C.1. To carry on the business of drilling and prospecting for oil wells and deposits. Nominal capital £10,000 in 10,000 preference shares of £1 each and 100 founders shares of 1s. each. Directors Captain T. S. Masterman, 6, Waterloo Place, S.W., G. P. Evans, Loves Grove, Aberystwyth. Qualification of Directors £1. Remuneration of Directors £50 to be divided.

SULPHUS CHEMICAL CO., LTD., The Manor Works, Eccleshill, Bradford.—Chemists, druggists, drysalters, &c. Nominal Capital, £5,000 in 5,000 Shares of £1 each. Directors: Rita Levin, 1, Kidderpore Gardens, Hampstead, N.W.; T. B. Greenwood, Manor Works, Eccleshill, Bradford. Qualification of Directors, £100. Remuneration of Directors to be voted by company in general meeting.

THORNTON & HOPKINS, LTD., 76, Arthur Street, Hull.—Drysalters and general stone dealers. Nominal capital £500 in 500 shares of £1 each. Directors: H. R. Hopkins, 86, Devon Street, Hassle Road, Hull; F. J. Thornton, 10, Arch Avenue, Holmes Street, Hull. Qualification of Directors £1. Remuneration of Directors to be voted by company in general meeting.

WESTERN DEVELOPMENT CO., LTD., Broad Street House, Old Broad Street, E.C.—To prepare for market and to deal in lead, zinc, copper, silver and other ores, metals and mineral substances. Nominal Capital, £25,000 in 100,000 shares of 3s. each. Minimum Subscription, 7 Shares. Directors: R. Salisbury-Jones, Lyme House, Elmtree Avenue, Esher, Surrey; J. Symon, 40, Buckingham Gate, S.W. 1. Qualification of Directors, 1 Share. Remuneration of Directors, £200 each.

The Affairs of E. E. F. Heesch

The public examination of Ernest Erwin Ferdinand Heesch, lately trading as a manufacturers' agent at 212, Wellington Street, now trading as The Gatap Co., an oxy-acetylene welder and chemical manufacturer at Stansfield Mill Yard, 77 and 79, Kirkstall Road, Leeds. was held on August 12, at Leeds, before Mr. Registrar Greenhow.

In reply to the Official Receiver (Mr. H. Clifford Bowling) the debtor said his statement of affairs showed gross liabilities £1,014 19s. 6d., net £924 5s. 1d., and assets £156 15s. 7d. He was a Dane by birth, but "German by conquest." He came to England in 1891, and in 1915 began business as oxy-acetylene welder at Stansfield Mill Yard as "The Gatap Co." with £50 borrowed from a relative. He had had no practical experience of this business. In 1917 he entered into an agreement with another man to commence as chemical manufacturers, the intention being to convert the business into a limited company, but before this was done he used the stationery of the Gatap Co. for the new chemical business, and thus made himself responsible for the debts. It was not profitable and it was not possible to form a company, and on June 30, 1918, he gave notice to terminate the agreement, taking over himself entire responsibility. He had provided proper and full books of account, but these had not been kept up to date. He had filed special accounts at the request of the Official Receiver, which showed loss from December 1, 1917, of £47 0s. 1d. The household expenses of himself and his wife were £554 6s. 10d., and he agreed with the Official Receiver that his failure was largely due to extravagance in living and lack of knowledge of the business. The examination was adjourned for further investigation.

Trade Marks, Patents, and Designs

BOTH the Trade Marks Bill and the Patents and Designs Bill passed their third reading in the House of Commons last week.

While the Trade Marks Bill was before the Standing Committee Mr. Hood moved an amendment to Clause 6, which provides that "where the trade mark is the name or only practicable name of patented article," all rights to exclusive use shall cease upon the expiration of the patent, moving the omission of the words "name or." He said many owners were under the impression that this clause would seriously affect existing marks. He instanced a soap product extensively advertised, and said the loss of name would involve the abandonment of a large amount of advertising material. The Solicitor-General said the article in question was not patented, and was not affected by the clause. It was intended to apply chiefly to a very large number of chemical substances which were made by Germans, and he instanced Eurotopene, which, he said, anybody could make, but Germans having got that name were endeavouring to prevent other persons from using it. Mr. Hood withdrew the amendment, remarking he was not anxious to protect German trades.

Notices

(Three lines, 3s.; each additional line, 1s.)

G. R.

By Direction of the Disposal Board, Ministry of Munitions.

AT THE SOUTH METROPOLITAN GAS CO'S, WORKS,

OLD KENT ROAD, LONDON, S.E.

To Chemical Manufacturers, Dye Works, Laundries, Engineers, Machinery Dealers and others.

HENRY BUTCHER & Co. have received instructions to sell by Auction on the above premises on Tuesday, August 26th, 1919, at 11 a.m., the EXTENSIVE PLANT and MACHINERY as used in the Manufacture of Synthetic Phenol comprising:

The nearly new KESTNER EVAPORATING PLANT, complete with all the necessary Apparatus, Tanks, Tubes, Receivers, Condensers, &c., capable of dealing with about 10,000 gallons Caustic Soda per 24 hours; 100 H.P. HORIZONTAL STEAM CONDENSING ENGINE by Tangye, 9 ft. × 6 ft.; 9 48 in. diameter CENTRIFUGAL HYDRO EXTRACTORS with plate copper baskets, by Manlove Alliott & Co.; 8 STEAM JACKETTED SULPHONATORS, with special stirring gear (about 800 gallons capacity); 6 REFLUX CONDENSERS fitted with 2 in. lead coils in galvanised iron tanks; 22 PITCH PINE VATS, from 8 ft. to 10 ft. in diameter, assorted lead-lined and plain, and all fitted with Mixers and Gear complete; 8 ditto, new, unassembled; 8 GRINDING MACHINES (Follows and Bute), with spare parts; 2 3-ton "WAYGOOD OTIS" HYDRAULIC LIFTS complete; HYDRAULIC ACCUMULATOR, weighted for 650 lbs. per square inch; 2 3-ton PLATFORM WEIGHBRIDGES (Avery's); 19 C. I. FUSION POTS, 3 ft. 6 in. × 4 ft. 3 in., fitted with stirrers, bafflers, and gear complete; 4 M. S. RIVETTED STILLS, 6 ft. × 10 ft. deep; 8 C. I. EVAPORATING PANS 8 ft. × 6 ft., fitted with stirrers and gear; HYDRAULIC PRESS; 400 W. I. TRAYS, 4 ft. × 2 ft.; the new OIL CAKE PRESSING PLANT, by GREENWOOD & BATLEY, consisting of Distributing Pan, fitted self-contained Driving Gear; 2 HYDRAULIC CAKE MOULDING MACHINES; 4 SELF-FLUSHING ANGLO-AMERICAN OIL CAKE PRESSES, working up to 2 tons per square inch; DOUBLE PARING MACHINE; SET HYDRAULIC PUMPS for operating the above; HIGH PRESSURE ACCUMULATOR, 4 in. ram.

Also large quantities Steel Shafting Pulleys, Bearings, Belting Pumps, Lifting Tackle, Tools, Valves, Cocks, Fittings, Bricks, Timber, Steel Joists, etc., etc.

On view one week preceding Sale from 10 a.m. to 4 p.m. and morning of Sale.

Catalogues and all information from Henry Butcher & Co., Plant and Machinery, Valuers and Auctioneers, 63 and 64, Chancery Lane, London, W.C.2. 'Phone: Holborn 2295

Situations Vacant.

(Three lines, 3s.; each additional line, 1s.)

Unless specially asked for, Original Testimonials should NOT be forwarded with Applications, but only copies of them.

WANTED Two DRAUGHTSMEN used to Oil Mill Machinery. Permanent situation to suitable men. Apply, stating fully, age, experience, and salary required, to Box No. 18, CHEMICAL AGE Offices, 8, Bouverie Street, E.C.4.

For Sale or Wanted

(Three lines, 3s.; each additional line, 1s.)

PETROLOGICAL MICROSCOPES and other Microscopes bought, sold or exchanged. John Browning, (Dept. 24), 146, Strand, W.C.2.

CALCIUM TUNGSTATE, Calcium Fluoride, Soda Carbonite, Calcium Chloride. Small quantities for sale.—Particulars, Box No. 17, CHEMICAL AGE Offices, 8, Bouverie Street, E.C.4.